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Agriculture.

TOBACCO-GROWING IN QUEENSLAND.

We have received the following interesting letter from a correspondent at Newmarket road, Windsor, Brisbane (who writes under the *nom de plume* "Vuelta Abajo"), on the subject of the cultivation of tobacco in Queensland. We have frequently, in the past, devoted considerable space in this Journal to advocating the extension of tobacco-growing by farmers in districts where conditions are such as to offer every prospect of success, as at Texas (Q.), Bowen, and Cardwell, where a considerable quantity of pipe tobacco was grown in the first-named district, and cigar leaf in the North. What was then wanting to growers was a knowledge of the best way of preparing the leaf for market. The curing houses were mere sheds with no appliances for regulating the temperature. It was only when the Department of Agriculture took the matter in hand and engaged the services of Mr. R. S. Nevill, an American planter, with long experience in the business, that more suitable methods of cultivation, choice of soils in different districts, and the building of up-to-date curing houses at Texas, were undertaken; and that, under his management, the industry was extended and promised to become very profitable to tobacco-growers in suitable localities. In 1912, Mr. Nevill, in his farewell report for the year 1912-1913, made it clear that he regarded tobacco as the most profitable of all small crops, and saw no reason why Queensland should not supply the whole need of Australia, which was then equal to 15,000,000 lb. a year. The area under tobacco in the whole State in 1911 was 592 acres, and the produce of dried leaf was 476,532 lb., and in 1912 the acreage had increased to 692 acres, but owing to a severe drought, the dried leaf only totalled 241,969 lb., the average being only 350 lb. per acre as compared with 1,000 lb. and over in 1904-5-6 and 1910.

The value of an acre of tobacco was then about £30. The quantity of manufactured plug and cut tobacco made in Australia was 10,041,339 lb., which took 8,546,726 lb. of leaf, of which no less than 7,339,611 lb. was imported from abroad.

To come to later years, we see a woeful falling off in the industry in 1918, the total area under this crop being 213 acres only, of which 172 acres were in the Inglewood and Texas districts. The Bowen district showed a decrease from 34 acres of cigar leaf to 12 acres only in 1918.

Whatever may have been the cause of this serious fall in the tobacco industry, it is undoubted that good tobacco can be grown in Queensland. Everyone admits that the cultivation of the "weed" is profitable to the grower, and although Europeans have been attracted to it, the cultivation on the whole has been in the hands of the Chinese, and apparently, the time has not yet come when the European population will take a liking for its cultivation.

There is no want of a good market for good leaf, and prices have been offered by the manufacturing firms (Messrs. W. D. and H. O. Wills Ltd., and the British Australasian Tobacco Company) at from 6d. per lb. to 2s. 6d. per lb. for the different qualities. The annual quantity of cured leaf required by these firms is about 2,000,000 lb. At one time a bonus of 2d. per lb. for cigar leaf was given by the Commonwealth Government, which was afterwards discontinued. Any future bonus if given should certainly include pipe tobacco.

Our correspondent writes:—"As there is no doubt about the present being an opportune time, I crave space in the 'Agricultural Journal' in order to arouse interest in tobacco. A great deal of publicity has recently been given to the cultivation of cotton, castor-oil bean, flax, &c., but scarcely anything has been said about tobacco. In my opinion it is a crop of great importance, considering the facts that it thrives well in Australia and that such a large quantity is imported. The quantity of leaf produced from the Bowen district is from 20,000 to 40,000 lb. per annum, varying according to the season experienced.* From the Texas district it is about 60,000 or 70,000 lb. The quantity of leaf only, imported by Australia from the United States of America alone was 17,793,685 lb., valued at 8,583,010 dollars (about £1,716,000) for the year ending 30th June, 1919. This need not be if scientific and up-to-date methods are adopted in the production of Australian leaf, and a sufficient quantity produced to meet the requirements of Australian manufacturers.

"In the Bowen district, which produces a cigar-leaf, practically only one class of leaf is produced. It is from the Zimmer Spanish seed introduced about twenty years ago. The quality of some of the leaf, reproduced after all those years from seed reserved from season to season, without scientific selection, can be well conjectured by those who know anything about tobacco. Whatever may be said in favour of the Zimmer Spanish, it cannot be placed at the top as a cigar-leaf. Experiments should be made with other seed, and the stocks thus obtained from adaptable varieties would enable the district to produce better tobacco. Some time ago, whilst at Proserpine, I made available to the growers a list of varieties, which, in my opinion, would be suitable to the North Queensland cigar-leaf belt. Of course, it is rather difficult to say offhand whether they would, but they should certainly be tried out. Attempts have been made with the Sumatra, but so far the leaf produced from imported Sumatra seed does not compare with the Sumatra as known to cigarists. It should be remembered that tobacco is remarkable for the readiness with which it is modified by the soil and climate of the locality in which it is produced. Not only are the size and texture of the leaves greatly affected, but the quality, the strength, the flavour, and sometimes the colour (when cured), are changed to a remarkable extent. The plant after a few successive years in any locality assumes the characteristics and becomes of the quality peculiar to the tobacco of that district.

"In the districts which produce leaf for the manufacture of general smoking tobacco (pipe, cigarette, and chewing), there is scope for considerable improvement. The system of 'flue'-curing should be adopted as far as possible, and higher prices will result. The production of this leaf has largely been in the hands of Chinese, and their methods have been too well copied by whites. I might point out that there is one 'flue' in Australia, owned by Mr. Aitken, of Gunnedah, New South Wales. He has a large area under tobacco, and turns out a very nice leaf. The object of the 'flue' is rapid drying, retention of the natural aroma, and minimising the cost of handling the crop after harvesting. Proper manipulation of the 'flue' ensures the colours which grade high at the factory.

"Not too much fault can be found with Australian cultural methods. It is in the handling of the crop after harvesting, the housing of the crop, and preparing for market by grading, and by 'bulking,' 'sweating,' or 'conditioning,' that the Australian planter is very much behind the times. This part of the business needs a chapter to itself.

"Tobacco as a crop is an ideal one for the farmer, and is in the front rank of money makers. One acre will yield 1,000 lb. leaf (U.S.A. average), and if sold for an average price of 2s. per lb., makes a good return per acre. The yield can be increased by scientific cultivation and seed selection. Mr. Otto Olsen, of the Pennsylvania Department of Agriculture, has succeeded in producing the 'Slaughter' strain, which goes over 2,000 lb. per acre, and the bulk of the trial crop was wrapper grade. It is the general rule that the higher the yield the better the quality of the leaf. Special qualities of leaf fetch a high price. For instance, Hanover 'brights' (Virginia), sold for over a dollar per lb. last November. High grade cigar wrappers (shade grown) realise as much as 6 dollars per lb. Last year the Australian tobacco

The Annual Report of the Department of Agriculture and Stock for 1918-1919 gives the return of Tobacco in the Edgecombe Division of the State, which includes Bowen, Proserpine, and Townsville, as 10,615 lb., 9,888 lb., and 5,036 lb. respectively.—(Ed. Q.A.J.)

companies made an offer to the Commonwealth Board of Trade to purchase 2,000,000 lb. weight of Australian-grown flue-cured tobacco each year for three years, starting from the date when the first year's crop is marketable. The prices offered range from 6d. to 1s. per lb. for bright and dark, 1s. 6d. for dark, 2s. for bright mahogany, and 2s. 6d. for lemon colour. The acting president of the board stated that those prices were highly satisfactory from the grower's point of view. Queensland cigar leaf fetches about 2s. 6d. per lb. (firsts) in Melbourne.

"Compared with cotton, about which a lot of publicity has recently been given, tobacco stands very favourably. Major Glessner, a prominent agriculturist of Georgia, U.S.A., and an authority on both crops, is of the opinion that tobacco beats cotton. In an address to the planters of Georgia he said:—'When a man told me how much his tobacco farming cost him, I asked him how much better his cotton was doing, and how much more he got out of it? He was obliged to admit that the prospect was, that his cotton would bring him less and take three times as long to find it out. When he talked of how much his tobacco houses and experience had cost him, I asked him was he going to throw both away? The only way to come out well is to plant tobacco again, and capitalise on both barns and experience. No man ever stopped growing cotton because one year's crop was a failure, or the market unsatisfactory. As a usual thing they increased their crops the next season, and never thought of abandoning their efforts until the boll weevil put them out of business. It is my opinion, after careful investigation, that the grower should stick to tobacco as a safe crop, and one that will in the long run bring more profit than cotton ever did.'

"I do not contend by any means that cotton culture should not be taken up in this country—quite the contrary. In the Southern States (U.S.A.) both crops are very often cultivated side by side, and it would be a splendid thing if we do likewise. A great deal can be said on the merits of these two valuable crops. Tobacco is essentially a dry-weather crop—an important thing in its favour in this country.

"I would like to add something on general cultural methods, seed selection, tobacco houses, flues, sweating, grading, &c., but the subjects are too large for a letter such as this. Thanking you in anticipation for publication."

AGRICULTURAL CO-OPERATION IN ENGLAND.

We are indebted to the Secretary of the British "Agricultural Organisation Society," The Broad Way, Westminster, Londan, for the following article entitled "Agricultural Co-operation in England." With the sender, we feel sure that agriculturists in Queensland will be interested in what is taking place in the industry on the other side of the water. While co-operation in agriculture is not new in England, yet its growth during the past twelve months almost entitles it to the description of a new movement—one which is certain to affect profoundly the future of English agriculture.

We commend this article to the earnest consideration of our country readers, many of whom have always been strong advocates of co-operation in agriculture in this State. We are promised short articles from time to time from the same source, and trust that such a movement in the interests of the farming community will find a congenial home in Queensland.

AGRICULTURAL CO-OPERATION IN ENGLAND.

Some account of the striking development of agricultural co-operation in England during the last year will be of interest to the wider circle of agriculturists. Much was heard of the word "reconstruction" during the last stages of the war and for the first few months following it, but it is difficult to point to any great achievements in this direction is most departments of national life. It is pleasant to be able to say that agricultural co-operation is an exception. The progress made during the past twelve months has been little short of phenomenal compared with the previous rate of growth.

Prior to the armistice, besides a certain number of co-operative dairy societies, some co-operative slaughter-houses, and a large number of small societies dealing with eggs, poultry, fruit, market gardening, and allotments, there were only six or seven large co-operative farmers' societies for the purchase of raw materials (feeding stuffs, fertilisers, seeds, machinery, &c.), which covered but a fraction of the country. In other districts there were either under-capitalised and struggling societies or no societies at all.

The prospects of English farming after the war have been by no means clear. There has been an unstable market in farmers' requirements, and a feeling of uncertainty as to what will happen when control is removed in the various branches of the industry. The introduction of the minimum wage and of standardised working hours into agriculture has introduced a factor the future effect of which it is impossible to calculate. The prospect of severe competition from imported food is always present in the farmer's mind. In spite of governmental assurances, the farmer is for all these reasons justly apprehensive as to the future of his industry, in some cases even to the extent of fearing a return to the hard times experienced between 1880 and 1900.

The result has been to make him incline his ear favourably to the claims of co-operative trading, which lead to a real economy in production and a more advantageous system of marketing his produce. The fact that most other businesses have, during the war, made themselves strong by amalgamations and combines has helped in this process, for nowhere are there more combines, rings, and cartels than in the agricultural trade.

The position was admirably put in a letter to a leading farming paper recently—"What is and has been," asks the writer, "the position of the isolated independent farmer working his business as a private trader? He buys a machine here, an implement there, a few tons of cake or artificial manure somewhere else, a few quarters of seed and feed corn, or a few bushels of small seeds, and so on, in another place. These have all to be sent separately, and, naturally, expensively. To express the matter in a sentence, he is buying retail and at a retail figure. But when he goes to sell his produce, the boot is on the other foot; he has to sell to the miller, to the merchant, or to the butcher wholesale, so that the individual farmer, working, selling and buying as a private trader is buying in a retail market and selling in a wholesale one. But as one of a body of farmers under co-operation, he has means in his hands of buying as well as selling wholesale."

During the year the Agricultural Organisation Society, the non-trading and non-political central organisation of the agricultural co-operative societies in England and Wales, has held nearly three hundred meetings all over the country to make the farmers' co-operative movement national in its scope. Its principal aim has been to establish in every country one or more large and well capitalised societies for the purchase of the farmers' requirements and the sale of his produce; and in the case of counties where societies already exist, to get them strengthened by increase of capital and unified by amalgamations.

This campaign met with instantaneous success. During the past eighteen months, societies have been formed in the following counties:—Northumberland, Durham, Cumberland, Yorkshire, Lincolnshire, Nottinghamshire, Warwickshire, Herefordshire, Devonshire, Cornwall, Somerset, Dorsetshire, Buckinghamshire, Surrey, and Kent. Some of these societies aim at covering the whole of their respective counties. In other cases, the counties were already partially covered, or in the case of the larger counties more than one society has been found necessary. Besides these new societies, in certain counties, such as Staffordshire, Derbyshire, and Leicestershire, amalgamations have been placed, and elsewhere the older societies have vastly increased their membership and capital.

The leading farmers through England now take great interest in the movement, and the most prominent feature of the campaign has been the readiness of farmers to subscribe sufficient capital (in most cases £20,000 to £50,000) to start their own society on a thoroughly sound basis, and be able to afford the best brains in the agricultural trading world for their management.

In January, 1920, the societies affiliated to the Agricultural Organisation Society included 469 trading societies dealing in farm requirements and produce, and 920 small-holders and allotments societies. Over one-third of the farmers in England and Wales hold shares in these societies, of which the annual turnover exceeds ten million sterling.

All societies are, of course, formed under the Industrial and Provident Societies Acts. Share capital is limited to £200 per member; interest is limited to 5 per cent. or 6 per cent. A co-operative society exists to make savings rather than profits, but any profits that arise after payment of interest, &c., and adequate provision for the reserve fund, are divided on the well known co-operative principle, *i.e.*, in proportion to the business which each member has done with his society.

A further enlightening fact is that the Agricultural Wholesale Society, formed two years ago to act as the co-operative wholesale society and the central trading body for agriculturists, has had a growth commensurate with the growth in the counties. It is equipped not only to buy farm requirements in bulk, whether at home or oversea, for distribution to the individual societies, but also to dispose of their united produce in the great markets of the world. The whole of its shares are owned by the agricultural co-operative societies in the country, and its profits go back to the member societies in proportion to the volume of their trade with it.

SUNFLOWER SILAGE.

"It may be the most important cattle feed discovery of years," is the significant sentence with which a writer in the American "Country Gentleman" introduces an article on experiments made in the State of Montana, U.S.A., with sunflower ensilage as a feed for dairy cattle. Lieutenant-Governor W. W. McDowell, of Montana, who owns the Valley of the Moon ranch, near the town of Missoula, by his own experiments, has found these were average figures for production of an acre in Montana:—Lucerne, 3 to 4 tons; timothy, 2 tons; sunflower, 25 tons.

For years the agricultural department of the Montana State College at Bozeman, Montana. had experimented, and had officially announced that sunflower silage was a splendid feed for cattle—for dairy cattle in particular; that it was good for the cattle; that it made a cow give more milk; and that the tonnage an acre far exceeded anything that could be expected of lucerne or timothy.

Farmers began to think about it. They heard, too, that in the Eastern States corn produced the largest tonnage for silos, and that 10 tons an acre was the best average corn could show in the most favoured States. Here, then, was a sunflower variety whose lowest average was two and a-half times as great, and which had been known to produce as high as 40 tons an acre, growing freely in the Montana climate, and, on paper at least, with everything to recommend it.

The "Country Gentleman" reporter paid a visit to the Valley of the Moon ranch to see for himself. He found 5 acres under sunflower. It was the Russian variety. The plants stood from 6 feet to 8 feet tall, as a general average. Some were 10 feet tall, and here and there were a few that stood 15 feet. From the foreman he learned that it cost five dollars an acre to plough and harrow the ground. The seed for the 5 acres cost four dollars an acre. The ground had been prepared in May, and seeded in June. It was really at least four weeks late. With this handicap the yield on the strip of the Valley of the Moon ranch was up to the average.

The sunflowers grew in rows 30 inches apart, and were about 6 inches apart in the rows. During the growing season the sunflowers were cultivated between the rows just as corn would be. The summer of 1919 was unusually dry in Montana, and a little irrigation was used. Plenty of water causes the sunflowers to grow larger, but it is said that they can be raised on what is commonly known as dry land.

On a larger acreage the cutting would be done with machinery, but Mr. McDowell used a corn knife. The plants are cut as near the ground as possible, because every bit of the stalk is valuable silage. The harvesting operation was very simple. Six men attended to the job. Two cut the plants, two hauled the sunflowers in wagons to the silo, one fed the chopper, and the sixth played a hose on the sunflowers as they passed through the chopper. The 5 acres were cut, harvested, chopped, and deposited in the silo in six days, or 48 hours of actual work.

Lieufenant-Governor McDowell says:—"The best way to use the sunflowers for silage is to cut them green and prepare them at once for the silo. At the same time farmers who did not have a silo have obtained very satisfactory results by cutting them green and shocking them as is done with corn in the Southern and Eastern States. Farmers near Huntley, Montana, tried this last summer and found it worked all right. Cattle seem particularly fond of it, and will leave nearly any other kind of feed to get the sunflower silage."

The silo on the Valley of the Moon ranch has a capacity of 100 tons. It was built during the past summer. It measures 34 feet from ground to roof. It is circular or rather polygonal in shape and 14 feet in diameter on the inside. It is of lumber and has double walls containing a 4-inch air space. This air space acts as a non-conductor of heat, and is supposed to prevent the silage from freezing during the coldest weather. The silo has double doors built from top to bottom, each door about 3 feet by 2½ feet. The doors open to a covered manway built outside of the silo. Iron bars on the outside of the doors furnish a ladder.

The chopper is placed at the base of the silo on the outside. The chopper is operated by 15 horse-power oil engine. The chopper cuts stalks, boughs, and the flowers into particles about half an inch wide. A fan in the chopper blows the chopped sunflowers through a pipe to the top of the silo. Water is necessary during the chopping, otherwise the silage may become musty or mouldy. The chopper cuts at the rate of from three to six tons an hour. This particular outfit cost:—Silo, £120; chopper, £70; engine, £200; making a total of £390. At current Montana prices, the sunflower yielded £80 per acre, compared with £24 for lucerne and £14 for timothy. In face of these facts, Mr. McDowell says:—"If it can be demonstrated to the satisfaction of Montana farmers that a crop of this proportion can be raised on average ground; if the feed values are such as successful experiments have

shown to my satisfaction; if the feed is as good for cattle and for milch cows in particular, and if the cattle like it as well as is claimed, then sunflower silage is the most important cattle-feed discovery of a great many years.

"It practically means that a man can winter twice as many cattle by raising sunflowers as he could by raising lucerne, clover, rye, barley, redtop, or any of the ordinary grasses or crops raised for cattle feed in Montana."

Mr. McDowell is practical. He is a farmer and not an agriculturist. Nor is he seeking to force his sunflower views on others. His interest was attracted by the experiments at the Montana State College and then he held his own experiment. Mr. McDowell is convinced that he can better results this year.—"Queenslander."

THE AUSTIN FARM TRACTOR.

Some time ago, Mr. H. Leo Mossman, writing to the "Journal of the Jamaica Agricultural Society," suggested that the time would come when cattle-drawn ploughs would give place to the tractor. In a late issue of the above Journal he asks: "Is that time *now*, or do the cane planters of this country intend to wait for another decade before adopting modern methods? We are faced to-day with a spirit of unrest among labourers of every kind. The skilled men are clamouring for higher wages, while the unskilled are still more persistent in their demands for less hours and higher pay. Unquestionably the high cost of living, and of commodities of every kind, necessitates a material increase on old labour prices, but this might be offset by a more systematic use of implements than is at present in vogue. 'Cultivators' for weeding should take the place of hand-weeding wherever practicable, while tractors should supplant the cattle-drawn ploughs."

No one will deny that mechanical work is cheaper than that performed by hand, whether in the factory or on the land, and this fact is being recognised wherever machinery can be employed.

In connection with the use of tractors, a new British tractor has been introduced into Australia, under the name of "The Austin Tractor," by "The Canada Cycle and Motor Agency (Q.) Ltd.," and a demonstration of its powers was carried out on Friday, 7th May, at Mr. Frank Radcliffe's farm, Rocklea. There was a large attendance of farmers, sugar planters, and others interested in agriculture. The land on which the demonstration took place had not been cultivated for thirty years, and consisted of a hard, heavy loam, having a dense growth of couch grass, which would have taxed the strength of both horses and plough to break up at only a shallow depth. To the machine a four-furrow Sunshine plough was attached. It was the general opinion that a team of ten horses would require frequent spells to break up this land, and consequently very poor results could have been obtained by horse-traction The machine, driven by one of Mr. Radcliffe's sons, was easily started, and travelled at the rate of about 4 miles per hour, no stoppage occurring even on turning at the headlands, as it turns in a very small circle, leaving very little head or side-lands for future attention. On a low gear the tractor gives a draw-bar pull of 3,000 lb. It was on paraffin oil, and using only 2 gallons of kerosene and a little benzine for starting, with a three-furrow plough has ploughed an acre of heavy loam-land in one hour. The spring front axle combines stability with free action. The horse-power at 1,200 revolutions is 25 h.p. On average land, even with unskilled labour, it will do 5 or 6 acres a day. All working parts are enclosed, and practically impermeable to dust and wet. The test was eminently successful, and left no room for doubting what is claimed for it.

CO-OPERATION IN LAND TILLAGE.

In connection with the above machine, the co-operation of the farmers in any district might be attended with a great saving in the cost of preparing the land and in subsequent operations on the farm. Everyone is not ploughing on the same day, or, perhaps, not during the same week, and it would seem to be a good idea for several farmers to combine in the purchase of some form of tractor, to be used in turn in the various operations connected with the cultivation of the land. Co-operative action is no new thing, and wherever it has been tried, it has had the effect of largely reducing the expense of farmers in several directions.

Since the test of the Austin Tractor, on Mr. Radcliffe's farm at Rocklea, the manager of the Canada Cycle and Motor Agency has received a report of a successful demonstration of the capabilities of the machine on 27th April, on Mr. Thygesen's property, at Wyreema, from its Toowoomba representative, Mr. W. A. Elvery. The report states that this was a more severe test than that given on Mr. Hickson's property on the Drayton road, the soil on the former farm being heavy black, very dry, and hard to work. The plough used was a Saunders three-disc, which had to be weighted to force the discs to cut to the depth required, namely, 9 inches. On this occasion an outrigger was fixed to the side of the plough, and to this was attached a harrow 6 feet in width, thus completing the ploughing and harrowing in one operation. The saving of time in this manner is obvious. The plough turned 36 inches of ground each cut, and as the harrow used was 72 inches wide, it overlapped the ground ploughed by 36 inches, thus harrowing the ploughed ground twice. The field ploughed and harrowed covered 5 acres, and the work was completed in 5¾ hours. The machine could not have run better. During the trial, it was only stopped once to allow the onlookers to get a close view of its mechanism.

An experiment was then made with a mixture of crude oil and kerosene, and the tractor worked just as well with this mixture as on pure kerosene, which should be a good selling point for the tractor. Crude oil is sold at 11d. per gallon and kerosene (Voca) at 18s. per case. One gallon of crude oil and one gallon of Voca kerosene would cost 3s. 2d., and this quantity is sufficient to plough 1 acre. This may be considered cheap enough, 10½ gallons of the mixture being sufficient to plough 5 acres.

GRAIN ELEVATORS.

The question of the necessity for grain elevators appears to have occurred to the farmers in the far North, judging from a letter received lately from Mr. F. L. Wise, Field Assistant of the Department of Agriculture at Tolga, requesting that an article on these erections, published some time ago in this journal, be republished in the interest of the graingrowers of the Cairns district. That article was originally written by Mr. N. A. Cobb, and appeared in the "Agricultural Gazette" of New South Wales, and subsequently, by permission, in the "Queensland Agricultural Journal." It is as follows:—

When I see a farmer go to his nearest market town, several miles distant, pay 5d. each for bags by the wagon-load, take them home, and put them away in a dry place until wanted, then once more carry them out to the field, fill them with grain, sew them up, and, if he is a careful man, label each bag separately, lift the bags of wheat on to a high dray, take them to his barn, unload them, stack them, and then later on lift them down again, rip them open, clean the grain by machinery, bag it up again, label the bags again, and stack them once more until such time as the market price suits him; when I see him, having made a sale, unstacking them once more several weeks later, sewing up the holes the mice have gnawed meanwhile, lifting them again on to his high dray, and off again, one by one, at the railway shed; when I see the grain leaking out through bursted, torn, and gnawed bags all the way from the railway-shed to the seaboard; when I see bags of precious grain, representing the income of farmers in all parts of the country, standing days at a time exposed to the wet weather and losing value—simply because grain in bags cannot be handled fast enough to prevent a glut at the metropolitan or other central market; when I see valuable property, such as railway trucks, standing idle day by day, letting interest on the people's money go to waste, because these trucks cannot be loaded with bags of wheat quickly and despatched to their destination; when I see thousands of bushels of uncovered bags of wheat caught in a shower; when I see the wheat after several hundred miles' railway journey, unbagged and put into fresh bags before transhipping, because the original bags are worn out; when I see them again lifted, and lifted, and lifted slowly into the ship's hold; finally, when I lean back with a shudder and try to imagine the high old time the ship's rats and the weevils have among this honeycomb of bags of wheat—a picnic lasting, it may be, several months—until the grain is as last unloaded in London and shot into an elevator—when I see all these things I cannot find words powerful enough to stigmatise this universal use of bags. Because this thing is wrong in principle, and can be remedied.

The secret of the remedy—no, it's no secret; it is fairly written against the sky in scores of the greatest and most prosperous towns in America and Europe. Not the secret, then, but the principle of the remedy is this: *threshed grain can, in a large measure, be handled like water.* It will run, it can be poured, it can be

pumped; and if only our farmers, merchants, and railway architects will take pains to consider this simple idea, the result will be a change in our methods of handling grain, beginning in the field and ending at the mill.

What would you think of a man who lifted all the water out of his well in a bucket instead of with a pump? What would you think of a man who lifted all the water out over the edge of a tank instead of letting it run out through the faucet at the bottom? What would you think of a man who habitually carried water downhill instead of letting it run through a spout? What would you think of a man who, having 400 gallons of water to transport, put it into 400 one-gallon receptacles instead of into one 400-gallon tank? What would you think of a man who caught

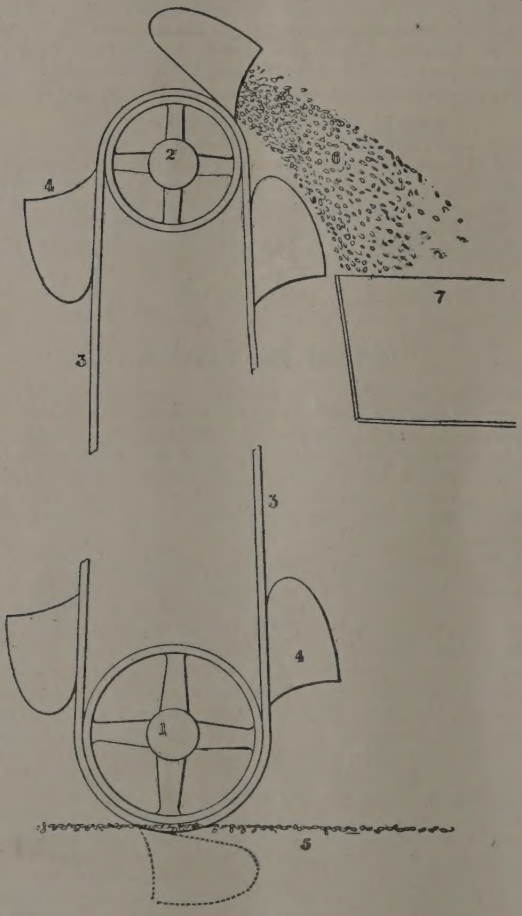

FIG. 1.—Rough diagram to illustrate the action of an elevating belt. The pulleys 1 and 2 carry an endless band, 3, to which are riveted buckets, 4. As the buckets pass round the lower pulley they dip into the grain, 5, and fill themselves. As they pass over the upper pulley they shoot the grain into a trough, 7. The distance from the lower pulley to the upper is over 100 feet in the largest elevators.

his roof-water in an underground tank, so as to have the pleasure of pumping it up again when he wanted it for use? What would you think of a man who preferred to store his water in a way that not only allowed but actually invited various sorts of vermin to injure it, and cause it to leak away? The English language is hardly strong enough to tell how big a fool such a man would be.

Yet, observe how grain is handled in Australia. It is lifted by hand, when to lift it by simple and inexpensive machinery would be both easier and cheaper. It is lifted over the edges of receptacles instead of being allowed to run out of them at

the bottom; it is habitually carried downhill instead of being allowed to run of its own accord. When being transported by the thousand bushels, it is cooped up in 4-bushel receptacles. It is everywhere put down so as to be lifted again by hand at the next handling. It is preferred to store it in a way that not only allows but actually invites various vermin to injure it and cause it to leak away.

Why not introduce the elevator system of handling grain, as has been done in America and Europe?

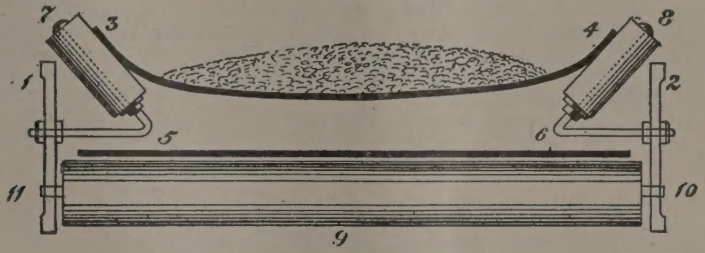

FIG. 2.—Cross-section of a horizontal grain-belt taken near one of the pairs of oblique rollers used to keep the edges of the belt somewhat raised.

1 and 2, sides of the long framework.
3, 4, edges of the belt.
5, 6, returning portion of the belt.
7, 8, oblique rollers for turning up the edge of the belt.
9, rollers for support of 5, 6.
10, 11, bearings of the rollers 9.

The grain elevator, as its name indicates, is a contrivance for raising grain from a given position, generally near the ground, to a higher position, generally a bin or silo, from which it can at any moment be delivered conveniently and quickly by means of proper machinery.

The essential elements of the grain elevator are:—

1. The elevating and transferring machine.
2. The weighing machine.
3. The bins or silos.
4. The cleaning machine.

The elevating machine is built in a great variety of forms, all, however, embodying the same principle, if we overlook the pneumatic elevator, which we may do for the present.

An endless band passes round two pulleys, one of which is placed above the other, and this endless band carries buckets which, on passing round the lower pulley, dip into grain contained in a hopper, and, on passing round the upper pulley, shoot the grain that has been dipped up into a receiving hopper or spout. See diagram in Fig. 1.

The grain thus elevated may be weighed in special machines adapted to receiving spouted grain, and which automatically register the weights. These machines are usually located at the top of the elevator building.

Before or after weighing, usually after, the grain is carried to its destined bin or silo by means of horizontal belts, or inclined spouts, or a combination of both. The belts are made of canvas, leather, rubber, or a composition, and vary in width from 1 foot to 3 feet, and, while usually running horizontally, may have a grade of 1 in 10, and yet work satisfactorily. A spout conducts the grain on to the middle of the moving belt, which latter receives an upward curvature at its edges through the use of pairs of oblique rollers every 15 to 30 feet, according to its width. Such belts are shown in illustrations 3 and 5, and a diagrammatic cross-section is given in Fig. 2.

The grain-belt delivers its grain into hoppers or spouts, either at its turning point or at an intermediate point, by means of a special carriage which zig-zags the belt as shown in Fig. 4.

The terminal elevators now in process of construction in the United States are costing about 30 cents per bushel of capacity. Previous to the recent advance in price of all kinds of material, terminal elevators were built at from 20 cents to 25 cents per bushel. I have seen (and examined in many cases) many hundreds of

elevators in all parts of the United States, and among them all have seen but one with iron bins. They must be uncommon. The large terminal elevators are seldom completed in less than twelve months; the smaller ones (100,000 to 200,000 bushels) may be contracted for at half the above time limit. As to particulars of most modern machinery, very much may be said. In general the grain-cars are run into the elevator and unloaded by means of steam-shovels—which are large scoops worked by means of rope tackle and a steam winch, the scoops being dragged empty to the ends of the car by hand, and then hauled back by steam, thus bringing the grain out in the course of a few minutes. The grain falls through an iron grating of about 4-inch mesh, designed to catch coarse materials, and to prevent accident, and then goes down into the hopper, into which the elevator buckets dip (see Fig. 3). The buckets, of which there are a variety of good makes, hold about half-a-bushel, and are attached to an endless band, which passes to the top of the elevator; here

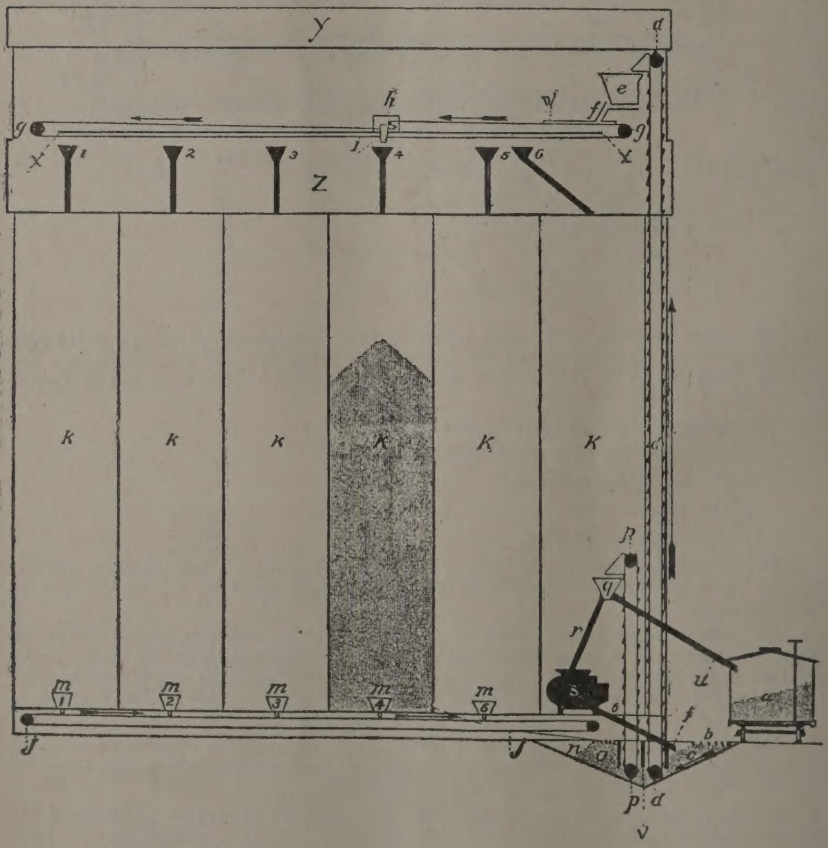

FIG. 3.—Diagram of an elevator. *a*, car with grain; *b*, grating over the hopper, *c*; *c*, hopper; *d d*, pulleys carrying the endless band and elevator buckets; *e*, weighing-bin; *f*, *w*, delivery spout to grain belt; *g*, *g*, grain belt; *h*, zig zag, which is moveable back and forth on the track, *x*, *x*; *i*, spout; *k k k*, bins or silos, to which the spouts, 1, 2, 3, 4, 5, 6, deliver grain; *m m m*, mouths of the bins or silos; *l l*, carrying-belt delivery into the hopper, *o*, through the grating, *n*; *p p*, secondary elevator delivering to hopper, *q*, whence the grain may go to the cleaner, *s*, *viâ r*, or to the car, *viâ u*; *y*, *z*, location of the roofs of the elevator.

the buckets, turning to begin their downward trip, empty themselves into the weighing-bins. These are so constructed as to be under the control of one man, who does the weighing. The bookkeeper has his office near the weigher, and works in conjunction with him. An automatic signal warns the weigher when the weighing-bin is nearly full, and he, by moving a lever, starts the grain to running into a second duplicate weighing-machine, during the filling of which he weighs and records the first, and starts it to emptying itself into its assigned elevator bin. When the duplicate weighing-machine is full, the first is empty, and so these weighing-machines

work along alternately. In the largest elevators a more elaborate system of the same nature is used. The weighing-machines are made by the principal scale-makers. The weighing-bins and other machinery in the top of a wooden elevator are supported on a different structure (separate) from the bins. The sides of these latter, in large elevators, vary in height several feet, according to their state of dryness, and are not a fit basis for the support of shafting, &c. This great expansion and contraction of the walls of the bins is a peculiarity of wooden elevators; brick and steel bins are more stable.

The grain is spouted from the weighing-machines to any desired bin by means of belts and various ingenious spouts, the best spout I have seen being the design of E. D. Mayo, of Minneapolis. This is an elbowed revolving iron spout, with a high degree of adjustability. A circular steel track 12 feet in diameter is hung from the ceiling under the weighing-bin, concentrically with the mouth of the bin. A light and simple steel carriage running on this circular track supports the lower end of

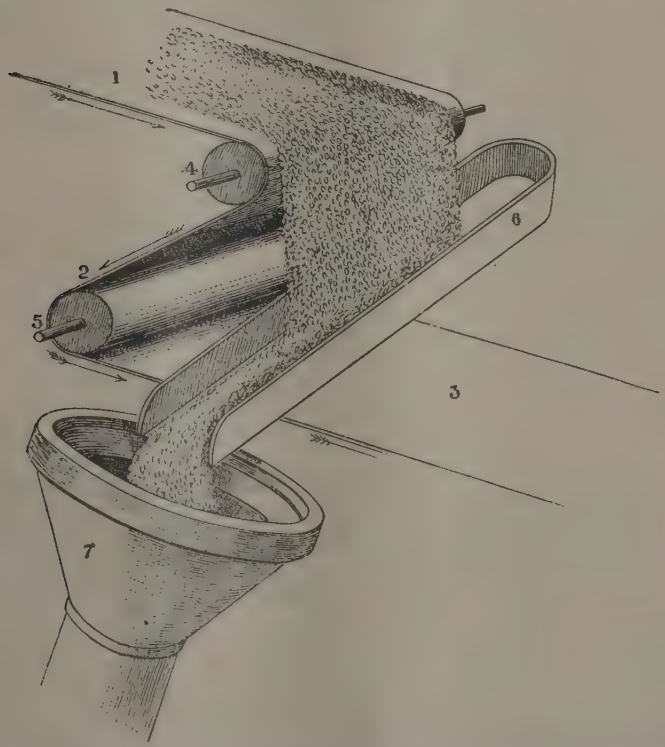

FIG. 4.—Diagram of a "zig-zag." The grain-carrying belt is shown at 1, 2, 3, and the direction of its motion is indicated by arrows; 4 and 5 are pulleys used to zig-zag the belt. The grain is shot into a trough, 6, which empties into a spout, 7, leading to a bin or elsewhere.

the iron spout, which runs out at an angle of 45 degrees from the mouth of the weighing-bin. This spout, therefore, revolves in a circle, and can be pointed in any direction; and attached to its lower end is a second long iron spout, with adjustable joints. The lower end of this latter rests on the floor containing the trapdoors leading to the various bins, and this lower end being on castors the spout can be easily dragged by hand and placed over any trapdoor within a radius of 15 or 20 feet.

The grain is generally cleaned and graded on one of the lower floors of the elevator by means of machines having a capacity of 1,000 to 2,000 bushels per hour; prominent among which I may mention the "Monitor" Wheat-cleaner, made at Silver Creek, N.Y. Wherever, in a large elevator, the grain is carried in a horizontal direction it is emptied on to a belt—flat, and about 3 feet wide—which runs horizontally, and is animated by means of pulleys run by an end-

less cable. This cable system runs in all directions throughout the elevator, and sometimes for a good fraction of a mile outside. Wherever it goes, its main object is to animate a series of wide, grain-carrying, horizontal belts. Sometimes, by means of an elevated outdoor system of this kind, grain is carried several hundred yards over the tops of buildings and warehouses to the ship's docks.

Whenever it becomes necessary to transfer the grain from a belt to a spout (as at a ship's side), a device is introduced by means of which the belt is zig-zagged and the grain is caught in a hopper and so spouted. Fig. 4 is a diagram showing the nature of one of these zig-zags. The zig-zags are a permanent feature of all large belts from which grain is spouted; and the best of them are on ways, and adjustable along the belt by means of hand-cranks.

The bins of wooden elevators are made of timber, 2 inches by 4 inches to 2 inches by 8 inches, spiked flatwise. The large terminal elevators, having bins often upwards of 75 feet deep, require 8-inch timber for the lower parts of the bins where the thrust is greatest; and this, among other reasons, adds to the relative cost of such elevators when compared with those of smaller size. The number of bins per elevator varies widely, according to the class of business, sometimes reaching 200 or 300. Large elevators often have bins of 50,000 bushels' capacity and upwards. These hold grains of various grades, various kinds, various seasons, various owners, &c., &c.

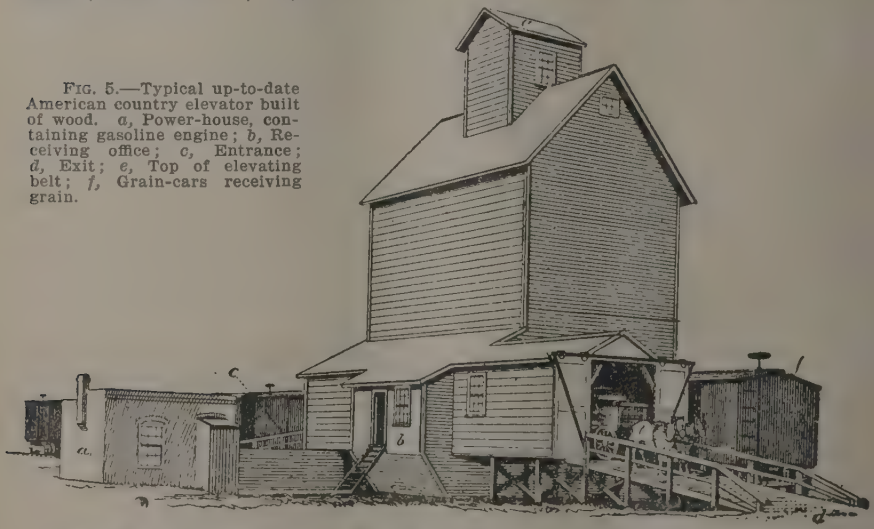

FIG. 5.—Typical up-to-date American country elevator built of wood. *a*, Power-house, containing gasoline engine; *b*, Receiving office; *c*, Entrance; *d*, Exit; *e*, Top of elevating belt; *f*, Grain-cars receiving grain.

These are, in general terms, the features of the most recently-built terminal elevators in the United States. The exterior appearance of some of these elevators is very well shown in the accompanying photographs, which I have taken, as opportunity afforded, in my various visits to the great wheat-handling centres of the world. Of such elevators there are some 200 in the United States, located principally at Chicago, Minneapolis, Duluth, and Buffalo. A one-million bushel elevator requires engines giving 125 to 200 horse-power, according to circumstances.

The country elevators, such as are used in the principal wheat areas of the United States, have a capacity of 20,000 to 40,000 bushels, and are constructed at from 15 cents to 20 cents per bushel, according to size—20 cents for the smaller size and 15 cents for the larger size. These are now often fitted with gasoline motors instead of steam. These elevators, as a rule, do not admit cars. Those of older construction do not even admit teams. An outside platform (often roofed over) receives the grain-wagon upon a platform scales, and the load and the wagon are weighed. Without moving, a slide in the side of the wagon is pulled, and the grain runs from the wagon into the receiving hopper. When the wagon is empty it is weighed, and this weight subtracted from the first weighing equals the delivery. In the more newly-constructed country elevators provision is made for driving grain-teams through the elevator. The illustration on page 143 shows admirably the general form of an up-to-date American country elevator.

The elevating and cleaning machinery are the same as for the larger elevators already described, only on a smaller scale. According to my observations, there are

between 15,000 and 20,000 of these elevators in the United States, some single States containing nearly 2,000. These elevators are owned by various elevator companies, which compete with each other in the liveliest fashion. The country elevators are the main feature of the American elevator system. They handle all the wheat raised east of the Rocky Mountains, and some of that raised on the Pacific Slope, while the terminal elevators of large size handle only the grain that is exported. Very much more capital is invested in these country elevators than in the large terminal elevators. I have seen scores of small towns having three or four of these small country elevators each—in fact, this is about the average number per railway depôt in North Dakota and North Minnesota. Plenty of country towns contain six or seven, and I am informed that the little town of Eureka, South Dakota, possesses no less than thirteen. Of course, each elevator under such circumstances represents a different owner, except where, as is not seldom the case in larger country towns, one company has two or more elevators in the same town.

FACTORS IN SUCCESSFUL TRACTOR WORKING.

In view of the great interest taken by the farming community of Queensland, more especially in the sugar districts, in the advent of the tractor for ploughing, harrowing, and furrowing, we think it well to invite their attention to the following article which appeared in the "Agricultural Gazette" (London) for 26th March last, having reference to the successful working of a tractor, and, what is of great importance, to the training of a driver, and to the method of dealing with the wages question. The writer, D. N. Hardy, sets forth very clearly a method of apportioning the pay of a driver, when the tractor is at work, to the value of his services when the machine is idle:—

"Primarily, the successful working of a tractor, like anything else, depends upon the owner himself. His managerial ability will generally be indicated by the results obtained in all the branches of his farm, and anyone who gets first-class results in other departments ought to get the best out of a tractor, too.

"The first point the owner must consider is to have a really good driver, as the operator has really the biggest influence on the year's balance-sheet. In many cases, especially on smaller farms, the owner is himself the driver, and it is noticeable that in a great many cases the owner-driver gets by far the best results from his outfit. The reasons for this are, of course, perfectly obvious. However, there are various objections to the owner driving his tractor himself. For one thing, it is often very inconvenient for him to be tied to one particular job, while unless he has a good bailiff or a partner to keep an eye on the labour, he will get very little work done on other parts of the farm; for all the time his engine can be heard running, his men know the master is not coming their way.

"In many cases the owner's son makes a very successful driver if he has mechanical aptitude, since he also has a personal interest in the tractor.

"If a hired driver has to be engaged, great care should be taken to select the right man for the job; and it is to be regretted that the shortage of skilled drivers at the present time often impels owners to employ most inefficient drivers, entailing constant breakdowns and heavy repair bills. In this connection it may be remarked that a few training centres where future drivers could be taught driving and repair work, on really sound, practical lines, would be a great boon to tractor users. Such a centre should be staffed by men with a thorough practical knowledge of all conditions under which tractor work is carried on; and, furthermore, the instruction should include the actual handling of tractors in the field, minor repairs and adjustments, setting of implements, &c., and not of mere blackboard talks.

"A natural aptitude for mechanics is essential if a man is ever to make a good driver; and by the establishment of such centres those unsuitable for the work could be picked out in a very short time, and be advised to give up. Such schools might conveniently be run in conjunction with some of our agricultural colleges and farm institutes. It would also be in the interests of manufacturers to give thorough courses of instruction in driving their own types of machine.

"Of course, the ideal way to learn driving is to get placed as a second hand on a tractor in actual use; but the difficulty is to find anyone willing to take the risks of training a novice on a machine which is depended on to carry out the work of a farm.

"If a driver is to be specially trained for a tractor it will generally be found that one of the mechanic type, from a country town, will be likely to prove successful; since amongst other things he combines the quickness of intellect of the town worker

with some knowledge of farm conditions. In any case, it should be obvious enough that no one should be put on the job who is prejudiced against mechanical traction.

"In order to secure a good driver it is necessary to pay a wage a good deal above the minimum. To attempt to do otherwise is absolutely false economy, and the extra amount should be considered as a form of insurance. By paying for a good driver at higher rates one minimises the risk of damage to several hundred pounds' worth of machinery, and diminishes the rate at which it depreciates. Moreover, when a man is ploughing, say, four acres a day, he can obviously be paid a good deal more than one who is ploughing one acre with horses, without bringing the cost of labour per acre very high. Furthermore, a man who can keep his tractor in running order, and available at any moment it happens to be wanted, is certainly worth a good deal more than one whose machine is standing idle on many days when it could otherwise be working.

"With regard to the extra wages suggested for the tractor driver, it may be contended that these cannot be paid in respect of days when the tractor is idle and the man is engaged on ordinary farm work. To meet this point, the system of payment employed by the Food Production Department during the war may be worth the consideration of tractor owners. By this system the driver would be paid the minimum wage regularly, together with a bonus upon each acre worked, calculated upon agreed rates. By this combination of piecework and time-paid rates the driver is paid a higher wage than the other men; but the amount is automatically reduced when the tractor is idle. Various modifications in the system may be introduced in order to insure a reasonable amount being paid at all times.

"Assuming that the important question of obtaining a good driver is satisfactorily settled, another point of great importance is the type of tractor used, and its suitability for the farm it is employed on. Every class of tractor has some special features that make it suitable for certain types of farm and certain kinds of work; hence the farmer should see that he gets the right class of machine for the work he wants done. Without discussing all the types of tractor and their special uses, it may be said that for the average farmer the light to medium weight tractor is the most suitable general-purpose type, as showing the greatest adaptability to general farm work and to various types of farm. These tractors are also easier to handle in small and badly-shaped fields. If the farm or particular kind of work calls for special features in the tractor a specialised type to meet these requirements should be obtained. In order to gain some particular advantage it may be necessary to sacrifice some other advantages; but this is unavoidable, and here it is that the judgment of the buyer plays an important part.

"While a good deal depends upon the type of tractor used, far more depends on getting the proper type of implement to be used with it. When purchasing implements, the buyer should bear in mind the power and weight of his tractor. Makers often claim that their machines will pull larger implements than is really the case; but if the tractor is overstrained in this way the result will be less work done, constant breakdowns, and rapid deterioration of the tractor. As regards this point, it may be well to obtain the opinion of someone who has had experience with the make in question. In any case it may be taken as a general rule that none of the machines which fall into the category of light tractors are capable of pulling more than a two-furrow plough or its equivalent, on average land. The type of implement used will be dictated by the needs and opinions of the owner.

"In addition to implements, there is a certain amount of equipment which should be provided for the tractor, and which make for ease and economy of working. A lock-up trailer box, large enough to contain several days' supply of fuel and lubricating oil, together with tools, &c., will enable the driver to take his fuel with him, and obviate the necessity of sending it out by a horse and cart, which at once puts another item on to the cost of ploughing, &c. In districts where water has to be taken out from the farm the trailer box may be built on to a water tank with wheels, which can be towed behind the tractor, thus further saving extra labour.

"Attention to the provision of suitable tools and spare parts, including plugs, is well repaid. Amongst these may be mentioned a plug spanner which fits the plugs used. This will be found to save many broken porcelains.

"The general care and maintenance of the tractor, upon which depend its life and its availability at all times, contain many points which will be attended to by the expert driver, but ignored by the careless one. Such a driver is worth good wages, for he alone can reduce depreciation to the smallest possible figure. A bad driver, on the other hand, is dear at any price, for no tractor can be a paying proposition if it is ruined in one year. In any case a periodic overhaul should be carried out by a reliable mechanic.

"As regards actual costs, it is obvious that to a certain extent the more days per year the tractor works the less the cost. In this connection it is often assumed that a tractor is an economic proposition on a large arable farm only. However, as a tractor can usually be hired out very easily for contract work, it should still prove a good investment for the smaller farmer, especially if he has a driver who can carry out his own running repairs."

COTTON-GROWING IN QUEENSLAND.

Last month Mr. V. A. Wawn, the proprietor of "Wawn's Wonder Wool," in Sydney, paid a visit to Brisbane with the object of making inquiries into the possibilities of growing cotton in Queensland. Much of last year's production was purchased by him, and his only regret was that there was not a larger supply available. In interviews with representatives of the metropolitan journals, he stated that he had seen excellent samples of cotton grown in this State—samples that were second in quality only to those produced in Egypt. The cotton purchased by him from the Queensland Government was at the present moment being manufactured into cottonwool by special carding machinery, which he had installed in his manufactory in Sydney, and with this, he said, he would be able to increase by four or five times the present output of the finished article. This cottonwool was the first ever manufactured in Australia. The whole of the raw cotton to meet Australia's needs could be grown in the Commonwealth, and every encouragement should be given to assist the cotton-growing industry.

Mr. Wawn paid a visit to Mr. Murray's plantation at Redbank Plains, Goodna, where he obtained an excellent sample of cotton. Despite the unfavourable season, the cotton showed a splendid return. Mr. Murray told him that it was a mistake to grow cotton on larger areas than from 5 to 10 acres until the difficulties in regard to picking had been thoroughly overcome.

Our visitor said:—"At present I am utilising 25 tons of cotton every year for making cottonwool, and in the near future I expect to be utilising a ton a week. But owing to the high price of cotton to-day I want to stop exporting it. The price of imported cottonwool, for instance, has risen from 6d. lb. to 3s. 3d. during the past few years, and yet last year what cotton I was able to purchase cost me but 1s. lb. Certainly it needs treating before it can be manufactured into cottonwool, but I am anxious to treat the Queensland raw cotton and not import it. In the past I have imported my carding machines from Lancashire, but these will shortly be made for me in Australia. I trust that Queensland will see the practicability of taking up the growing of cotton in earnest. There is undoubtedly a great future for the crop when it comes. A thousand tons of cotton approximately are imported into Australia every year. I will eventually use my machinery for the manufacture of 'Wonder Wool' in the very spot where the cotton is grown, and, so far as I can see, that will be Queensland. If the small farmer will only get a move on he will not regret it.

"From a defence point of view Australia would benefit. She is bound one day to go in for munition making, and when she does she will need cotton. Every shell the 'Queen Elizabeth' fired over the heads of our boys at Anzac contained a cwt. of cotton. Further, there is no reason why we should not grow the cotton and spin it into gauzes, lints, string, cotton reels, and clothes."

Regarding Mr. Murray's opinion on the size of cotton plantations, we are quite of his opinion. We who remember the earliest days of cotton-growing, when the Lancashire Cotton Company commenced operations on a large scale, can substantiate his statement that cotton-growing, on a large scale, will not prove successful until a reliable mechanical cotton-picker has been introduced. In the days when farmers took up the business as an adjunct to other crops, and, at the most, planted 10 acres, cotton-growing paid them well, as a small area did not demand an army of pickers. An average cotton crop may be put at 1,000 lb. of seed cotton per acre, but over 2,000 lb. have been obtained per acre in a good season in Queensland. Last season the price realised by growers was 5½d. per lb. We ask: Will it not pay to grow cotton in small areas in conjunction with other crops? Which of the two crops—cotton and corn—costs most for harvesting and preparation for market. Corn must be pulled, husked, shelled, and winnowed; cotton has only to be picked, and it is ready for the market. Advocates of cotton-growing are invariably met with the objection that picking will cost too much. Are not the operations of picking, &c., in the case of corn, open to the same and stronger objection? Does not the work of hilling up, digging, picking up, and bagging entail expenses in excess of that attaching to cotton-growing and harvesting? There is no crop which entails less labour from seed-time to harvest than cotton.

HARVESTING, PICKING, THRASHING, AND STORING PEANUTS.

Most of the peanuts grown in Queensland are in districts where the industry is comparatively new. It may therefore be advantageous to growers to read the following directions for harvesting, picking, and handling peanuts, which directions have proved successful and are in use in the United States of America by the best and most progressive growers.

The following article on the subject was published by the United States Department of Agriculture (Circular 81):—

HARVESTING.

As no definite rule can be given by which to determine when peanuts are ready to dig, each grower must depend largely upon his own judgment. In the lower South, where frosts do not occur until quite late, the vines assume a yellowish colour when the peanuts are mature. Peanuts should be dug when the vines have the greatest number of mature pods. Beginners in peanut growing should be careful not to dig too soon, as immature nuts shrivel and are light in weight when cured. A few early-formed peas are likely to sprout before digging time, especially if there is a period of rainy weather about the time the peanuts are maturing, but usually the loss by sprouting is not sufficient to justify premature harvesting.

Peanuts ordinarily are ploughed from the ground with a turnplough which has the mouldboard removed, as shown in figure 1, to prevent throwing dirt over the

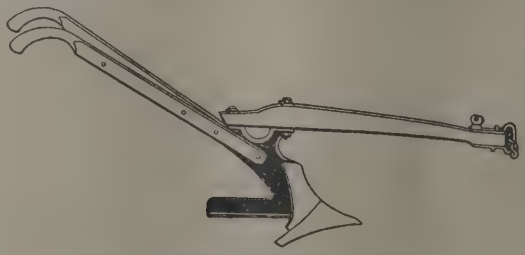

FIG. 1.—Plough Type of Peanut Digger

vines. This plough should be regulated by means of a wheel attached to the beam so that the peanut roots can be cut off at any desired depth. The machine potato digger, shown in figure 1, does very satisfactory work and will dig 8 to 10 acres a day. This machine removes the peanuts from the ground and also shakes off the soil, leaving the vines lying upon the surface. As the machine digger is rather expensive its use is practicable only where a considerable acreage of peanuts is to be dug. The digging point of the machine can be set to cut off the root at any depth desired.

After the peanuts are dug, a gang of workmen shake the vines free from the soil and throw them in small bunches. Where the machine digger is used, this shaking is unnecessary, as the machine frees the peanuts from the soil. The vines are left spread on the ground or in small bunches for three or four hours and are then placed in small stacks around a pole to cure. If peanuts are allowed to lie exposed for a considerable time after digging, the pods become discoloured and lose in weight and the leaves drop off in handling.

The poles for the peanut stacks should be 3 or 4 inches in diameter and 7 to 8 feet long. These poles or stakes are set into the ground 12 to 18 inches and are well tamped to make them firm. In setting the poles a crowbar or a pointed bar of iron is necessary to make the hole.

Before starting the stack two pieces of lath, scrap lumber, or sapling cut from the woods, about 18 inches in length, are nailed at right angles to the stake 8 inches from the ground, as shown in figure 2, in order to prevent the peanuts coming in direct contact with the soil. In starting to build the stack a few vines are laid

across these pieces and the stack is then built up by successive layers of vines, the pods being kept well to the centre against the stake and the tops to the outside. The stems should have sufficient outward slope to shed water. (See fig. 3.) Occasionally a few vines should be hung around the stake in order to tie the stack together. By this method the pods will be near the centre and around the stake, where there is an upward circulation of air and general protection. When the stack has reached the desired height, a bunch of vines is rolled together and pressed down over the point of the stake to form a top, or a little dry grass or a few weeds may be used for this purpose.

It is not advisable to use anything for topping out the small stacks that will prevent the circulation of air. A heavy cover or a covering of green or wet hay will invariably cause the peanuts to spoil.

FIG. 2.—Stakes around which Peanut Vines are to be Built.

Curing in barns is not advisable either when curing peanuts for market or where the entire plant is fed to stock, as the crop will cure better in small stacks than when stored in bulk. After the nuts have been cured in the stack from four to six weeks, those intended for feeding purposes may be stored in barns or sheds.

Where stakes are difficult to secure and labour is scarce peanut growers sometimes rake the peanuts into windrows with a hayrake and stack them like hay. In doing this they should cure a little longer before stacking than when they are to be put in small stacks around stakes. If the weather is dry during the curing and stacking and hogs can be turned into the field to save the peanuts left, there is very little loss by this method. Should the peanuts become wet while in the windrows they are seriously damaged for commercial purposes, but the damage is not so great if they are to be fed to stock. This plan should be followed only when it is not practicable to stack them around stakes as described.

PICKING AND THRASHING PEANUTS.

Peanuts should cure in the stack at least three or four weeks before picking or thrashing, in order to allow the pods to become dry and the peas firm.

Peanuts are still picked by hand in some sections, especially when the grower has only a few acres. Hand picking is a very laborious and dirty task. The expense of picking by hand is greater than by machinery, and as it is difficult to get enough labour for handwork machines are used by practically all large growers.

Two types of machines are used for picking peanuts from the vines. The common grain thrasher with a special cylinder for peanuts gives quite satisfactory results in removing Spanish peanuts from the vine. The principal objection to cylinder machines is the tendency to break the pods, but by running the cylinder about 400 revolutions per minute and by feeding properly the breakage can be reduced to a very small percentage. If the peanuts are to be shelled soon after they go on the market, the breaking of the pods is not very objectionable. When oats or wheat are grown in localities where peanuts are raised, a cylinder machine can be used for all of those crops by having two cylinders, one for grain and one for peanuts.

FIG. 3.—A Labourer Building a Stack of Peanut Vines, showing the method used. Completed Stacks are shown in the background.

The peanut picker works upon an entirely different principle from the cylinder machines. The picking is done by dragging the vines over a horizontal frame covered with wire mesh. The nuts drop through the wire and at the same time rubber brushes attached to an endless chain act on the lower side of the screen to remove the nuts. In addition to removing the pods from the vines, these machines have cleaning and stemming devices which remove the dirt and the small stems from the pods. The picker type of machine does not break or injure the pods, and for this reason it is especially desirable for picking peanuts that are to be sold in the pod or stored through the summer months.

After the peanuts are picked they should be stored in a dry place, preferably in a mouse-proof building. If the peanuts are damp after their removal from the vines they should be spread on a floor or stored in a well-ventilated building. When the pods are dry they may be put into bags as they come from the machine.

STORING PEANUTS ON THE FARM.

The farmer's safeguard in the matter of prices obtained for peanuts lies largely in his ability to hold at least a portion of his crop through the winter. Farmers should be prepared to hold their crop for a time rather than place it upon the market during the autumn, when the prices are generally lowest. In order to do this, suitable storage facilities are necessary.

Frequently the bags of peanuts are simply piled in an open shed or in a barn, where they are not properly protected. Occasionally the bags are stacked upon the ground in the field without even the protection of a canvas cover. Neither of the methods mentioned should be followed, because the peanuts would be injured by moisture and subject to the ravages of rats, mice, and other rodents. A building suitable for storing peanuts need not be expensive, but should protect them against injury by moisture and rodents and provide sufficient ventilation. A building constructed of rough timber, with an iron roof, is satisfactory for storing peanuts, provided it is built up from the ground and all openings for ventilation are screened to keep out mice and rats.

In most cases peanuts are stored in bags, because this is the most convenient method. The bags should not be piled more than seven courses high and alleyways should be left every third or fourth row. Some growers follow the practice of storing in cribs or bins, where the peanuts are piled loose until they are wanted for market, at which time they are bagged. The method of storage on the farm matters little, provided the conditions are suitable. The less peanuts are handled the better, on account of breakage.

MARKET GARDENING.

HERBS AND THEIR CULTIVATION.

For some time we have placed before our readers various articles on Herb-growing as a very payable adjunct to general farming. Those who have taken up the cultivation of such herbs as thyme, sage, and marjoram have not regretted doing so, as they have not only sold their season's crop to a good profit, but have been able to dispose of the next crop in advance.

The following article by "Coolibar" appeared lately in the "Queenslander," and is well worthy of serious consideration:—

"At last Queensland is awakening to the fact that the production of culinary herbs is of sufficient importance to induce the man on the land to tackle their cultivation. There always is on the part of any new departure from the old groove a certain amount of suspicion as to whether the venture will pan out all right, and it is well that such is the case, for otherwise every man would be up to his neck in the work of production, with the result that a glut would ensue. Therefore, although herb-growing presents a profitable aspect, it has its limitation as regards production. It is no use taking on herb-growing as a mere hobby; it must be taken seriously, for it is not all fun. In the first place, suitable soil must be chosen in order to ensure success. Even with suitable soil it requires special manipulation in order to get the best results. Deep working is essential, and liberal but not lavish manuring; uniformity of moisture, with free drainage, avoiding a sodden condition, or stagnant wet. A heavy friable loam is favoured for sage. A loam with 35 per cent. sand favours marjoram; while thyme will flourish in 70 per cent. of sand, provided the requisite amount of moisture is present; but very little manure is required, and manure of a vegetable nature is to be preferred to animal manure. If circumstances preclude the application of vegetable manures, as leaf mould or other decomposed vegetation, then thoroughly rotted animal manure may be substituted in sparing quantity. Ground for herbs should be loose below and packed on the surface. This may be brought about by means of rolling or treading immediately after ploughing or digging. In planting the plants should have the soil well firmed round the collars.

Sage should be planted in rows, the rows to be 30 inches apart, and 12 or more inches from plant to plant in the row. Marjoram the same as for sage between the rows, but the plants may be placed closer in the row. Thyme may have the rows placed 24 inches apart, and the plants in the row 10 to 12 inches apart. In every case firm planting is recommended. In the matter of harvesting, curing, packing, &c., Queenslanders have something to learn; and, as we forge ahead in the work, we are likely to stumble across lots of ways whereby we can improve upon the European methods of handling these crops. Some of the samples I have seen of the imported article leave plenty of room for improvement in the general get-up of the article. I have seen importations landed in a condition that was far from satisfactory—mildewed, half-rotten—resembling ensilage, fusty, and lacking flavour, for all the world like mouldy lucerne chaff. One could only conclude that it had been imperfectly cured before shipping. Rapid drying is one of the essentials in herb-curing in order to imprison the flavour and fragrance.

"Artificial drying has been tried, but found wanting. All herbs should be dried in absolute shade from direct sunlight; hence our dry atmospheric conditions lend themselves most favourably to the drying or curing of herbs. Most of the imported samples present the appearance of having been chopped fine by passing through a chaff cutter close set, as the samples contained all the woody portions of the shoots. A first-class sample of cured herbs should, however, contain leaves only, all woody parts being rejected. Sage is harvested in a slightly different way to that of marjoram and thyme. This plant will not stand cutting hard back; hence the top branches, which carry the bulk of the young shoots, are shorn off with a sickle, knife, or shears by handfuls, and the leaves and young shoots are picked by hand off the portion of the plant left standing. Marjoram and thyme may be cut to the ground by a sickle or other implement. Herbs as soon as severed from the plants should be conveyed to the drying-shed and spread out on trays, benches, or floor. A well-appointed drying-shed should be lofty, side ventilation all round, and a series of drying trays suspended one above the other from roof to floor. The trays may be made of the smaller meshed wire-netting stretched on pine battens, the dimensions to be regulated according to desire. The shed should be divided into three sections, each fitted with trays to avoid mixing. In filling the trays care should be taken not to overload them, for if this is done, or even irregular loading is indulged in, uniform drying cannot be expected, besides which resultant sweating of the heavier masses will cause discoloration, which detracts from the appearance of the finished article and prejudices its market value. When the contents of the trays are thoroughly dried they are unloaded on a clean floor or sheeting, and thrashed with a flail or well trodden with feet. When the leaves are separated from the stems the majority of the woody matter may be separated by means of a steel fork, such as is used for separating gravel and sand; the remainder may be passed over a screen and finished by means of sieving. In handling herbs you will quickly find out lots short of cuts in separating the leaves from the sticks. In the final dressing do not throw away the dust, as this is composed almost entirely of crushed leaves.

"The herb most in demand is marjoram, and it happens to be the easiest to grow, harvest, and thresh. The price in Brisbane at present for bulk parcels (anything from 1 cwt. to tons) ranges from 1s. to 1s. 5d. per lb., according to quality. Hand-picked sage will fetch from 1s. to 2s. per lb.; while thyme is about on a par with marjoram. All three are easily grown by means of seed, but when once the plants are established propagation by means of divisions and cuttings can be prosecuted *ad. lib.* Prior to the outbreak of the European war the importation of herbs into the Commonwealth of Australia exceeded £10,000 in value annually. It is up to us Australians to earn this amount ourselves, instead of paying it to Germany, France, Italy, and several of the Balkan States in Southern Europe. Herb growing is a nice, snug little crop to handle on a limited area of land, and when harvested and packed for the market a £5 parcel can be tucked into the buggy and trundled off to the nearest railway station, and be sent as a booked parcel to its destination. Just compare this with £5 worth of hay, chaff, potatoes, pumpkins, wheat, maize, and other general farm produce. No heavy drays or waggons needed in the herb business. Neither is the manual labour heavy. It is work that the women folks might take an active part in and feel all the better for it. The season for planting is from now right up to August or September, while the time of harvesting will vary according to locality. The crop is ready for the sickle when the plants come into flower.

"To make a start, sow the seeds in a sandy compost in prepared beds or, better still, in shallow boxes; by shallow boxes are meant boxes, say, 4 inches deep and any width or length. The containers of galvanised roofing iron are just first rate for the purpose; the wooden floor underneath the plants enables them to be lifted for transplanting without any serious root mutilation. Any further information that you may not be quite clear upon will be cheerfully given by 'Coolibar.'"

Pastoral.

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—BEEF AND DAIRY CATTLE.

The Office of the Secretary of the undermentioned Herd Book Societies is 303 Queen street, Brisbane:—

The Australian Hereford Herd Book:
The Shorthorn Herd Book of Queensland;
The Jersey Herd Book of Queensland;
The Illawarra Herd Book of Queensland;
The Ayrshire Herd Book of Queensland;
The Milking Shorthorn Herd Book of Queensland:
The Holstein-Friesian Herd Book of Australia.

NOTE.—Animals registered in the Commonwealth Standard Herd Book are not necessarily eligible for entry in the Jersey Herd Book of Queensland.

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
DAIRY BREEDS.				
AYRSHIRES.				
W. C. Smith	The Haven, Goomeri	1	7	Ayrshire Society of Queensland
L. H. Paten	"Jeyendel," Calvert, S. & W. Line	8	21	Ayrshire Herd Book of Queensland
J. H. Paten	Gwandalan, Yandina	6	21	Do.
Queensland Agricultural College	Gatton	4	10	Do.
State Farm	Warren	3	83	Do.
J. W. Paten	Ayrshire Park, Wanora, Ipswich	10	42	Do.
J. H. Fairfax	Marinya, Cambooya	9	55	Do.
J. Holmes	"Longlands," Pittsworth	6	20	Do.
H. M. Hart	Glen Heath, Yalangur	7	21	Do.
F. A. Stimpson ..	Ayrshire Stud, Fairfield, South Brisbane	7	77	Do.
M. L. Cochrane ..	Paringa Farm, near Cairns	5	21	Do.
John Anderson ..	"Fairview," Southbrook	7	34	Do.
JERSEYS.				
T. Mullen	"Norwood," Chelmer	3	20	Jersey Herd Book of Queensland
Queensland Agricultural College	Gatton	2	31	Do.
M. W. Doyle	"Oaklands," Moggill	4	12	Do.
G. A. Buss	Bundaberg	1	15	Do.
R. Conochie	Brooklands, Tingoora	9	21	Do.
W. J. Barnes	Millstream Jersey Herd, Cedar Grove	10	37	Do.
W. J. Affleck	Grasmere, N. Pine ..	6	31	Do.
J. N. Waugh and Son	Prairie Lawn, Nobby	3	28	Do.
W. J. H. Austin ..	Hadleigh Jersey Herd, Boonah	2	11	Do.
State Farm, Kairi ..	Kairi, *vid* Cairns ..	4	16	Do.
H. D. B. Cox	Sydney (entered in brother's name)	3	16	Commonwealth Standard Jersey Herd Book
GUERNSEYS.				
Queensland Agricultural College	Gatton	2	2	Eligible, but no Guernsey Herd Book of Australia

BREEDERS OF PUREBRED STOCK IN QUEENSLAND—*continued.*

Name of Owner.	Address.	Number of Males.	Number of Females.	Herd Book.
DAIRY BREEDS—*continued.*				
HOLSTEINS.				
Queensland Agricultural College	Gatton	2	9	Holstein-Friesian Herd Book of Australia
George Newman ..	"St. Athan," Wyreema	9	92	Do.
F. G. C. Gratton ..	"Fowlerton," Kingsthorpe	1	15	Do.
R. S. Alexander ..	Glenlomond Farm, Coolumboola	1	3	Do.
Ditto	Ditto	1	..	Holstein-Friesian Herd Book of New Zealand
S. H. Hoskings ..	St. Gwithian, Toogooloowah	..	..	Holstein-Friesian Herd Book of Australia
C. Behrendorff ..	Inavale Stud Farm, Bunjgurgen, Q.	3	9	Do.
E. Swayne	West Plane Creek, Mackay	1	2	Do.
ILLAWARRA.				
A. Pickels	Blacklands Stud, Wondai	4	62	Illawarra Herd Book of Queensland
J. T. Perrett and Son	Corndale, Coolabunia	3	43	Do.
W. T. Savage	Ramsay	2	22	Do.
Hunt Bros.	Springdale, Maleny ..	3	62	Do.
MILKING SHORTHORNS.				
P. Young	Talgai West, Ellinthorp	2	42	Milking Shorthorn Herd Book of Queensland
W. Rudd	Christmas Creek, Beaudesert	2	10	Do.
A. Rodgers	Torran's Vale, Lanefield	1	9	Do.
W. Middleton	Devon Court, Crow's Nest	3	27	Do.
A. K. Yorksten ..	"Dunure," Miles ..	2	8	Do.
W. H. Francis ..	"Exelawn," Colinton, Brisbane Valley Line	3	5	Do.
BEEF BREEDS.				
SHORTHORNS.				
T. B. Murray-Prior ..	Maroon, Boonah ..	2	37	Queensland Shorthorn and Australian Herd Books
C. E. McDougall ..	Lyndhurst Stud, Warwick (2)	25	100	Queensland Shorthorn Herd Book
Godfrey Morgan ..	"Arubial," Condamine	3	6	Do.
W. B. Slade	E. Glengallan, Warwick	2	20	Do.
HEREFORD.				
A. J. McConnell ..	Dugandan, Boonah	19	36	Australian Hereford Herd Book
E. M. Lumley Hill ..	Bellevue House, Bellevue	45	127	Do.
Tindal and Son ..	Gunyan, Inglewood	50	400	Do.
SUSSEX.				
James T. Turner ..	The Holmwood, Neurum	2	4	Sussex Herd Book of England

Dairying.

ITALIAN OR CACAVA CAVALLI CHEESE.

We are obliged to a Northern correspondent for the following description of the method of making this Italian cheese. The recipe is:—

If there is whey from the previous day put a little of this whey together with some of Hansen's or Barnecow's rennet into the milk, which it is best to have about 84 degrees F. Just put enough rennet that will show a firm curd in about half an hour. Should there be no whey from the previous day, let the milk stand for five or six hours before you put the rennet in so as to give the lactic acid a chance to work as well as the rennet. When the milk is firm enough to make a clean break as you go with the finger through it, cut it with a couple of knives or break it very gently with the fingers, then heat the milk very slowly to 96 degrees F. by either heating part of the milk over the stove or putting hot water round the vessel, stirring the milk a little with the hand so that the milk lets the whey go. The best way is to have two tubs of unequal size, the outer one for the hot water. The heating should be done very gently, and the curd will take four or five hours before it is ready, that is to say, sour enough, to rise and float. In the meantime it has to be divided often and very gently, otherwise the butter fat escapes. On no account let it get hotter than 100 degrees F. Towards the end draw off some of the whey. When the curd rises it is taken off the whey and cut into pieces the size of a marble; then hot water (nearly boiling) is poured on it and the whole stirred with a stick, when it will melt and is made by working with the hands into a rope. This is made into a ball by working it downwards and towards one point (something like working up a damper), putting the ball every now and then in the hot water to keep it soft and pliable. When worked enough (which is only known by experience), put it into salt and water for twenty-four hours (*not* in a galvanised vessel). For use as a fresh cheese and for toasting, the cheese is made into a three-strand plat and cut across the plat.

In Italy the cheese is made in the shape of calabashes, as there they hang the cheese (after salting) in the smoke of the kitchen for three days, and after that put it in the cellar.

SWEET POTATO SLIPS.

A very good idea for transporting sweet potato cuttings is that described in the January issue of the "Journal of the Jamaica Agricultural Society." In Queensland, sweet potato slips are cut and made up into small bunches for sale just as they are taken from the vine. The Jamaican cultivator adopts a different plan, which appears to be highly successful. In planting, or transmitting the slips, they are completely defoliated, with the result that the sap is conserved in them, causing them to make new growth quicker than when the leaves are left on merely to wither. It is especially in transporting slips that they should be defoliated.

On this point, an interesting experiment was made by the Superintendent of Instructors. He had supplies of potato slips defoliated, cut into short lengths, and sent by post, when several days elapsed before they were planted, added to which they were planted in dry weather. Very few of these cuttings failed to grow.

Defoliating potato cuttings before transporting anywhere will thus save weight and expense in transit besides making surer of growth when planted.

Reports received from growers of defoliated slips all agree in the good results obtained. One grower stated that out of fifteen slips planted in dry weather, without shade or water, twelve struck and grew well. Another reported that of twenty-five slips planted without water, when no rain fell for four days, twenty-three began rooting on the third day.

We have noted that sweet potato growers in this State, frequently, plant defoliated slips, but slips offered for sale in bunches usually retain their leaves.

Poultry.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1920.

Considering the changeable weather, and the fact that the majority of the birds were in lay on arrival at the College, the output for the last week of the month was very satisfactory. The health of the birds at the commencement of the test was not of the best, warts, colds, and minor troubles being in evidence, but health was quickly regained. Four deaths occurred, viz.—R. Holmes (B bird), broken bloodvessel; Range Poultry Farm (F), ovarian inflammation; Chaille, inflammation of the bowels; J. Ferguson (F), ovarian inflammation. The feeding of the birds is improving daily, a sure sign that they are getting accustomed to their new conditions. The following are the individual records:—

Competitors.	Breed.	April.
LIGHT BREEDS.		
*G. Trapp	White Leghorns	106
*J. H. Jones	Do.	101
*Haden Poultry Farm	Do.	98
*O. W. J. Whitman	Do.	93
*J. Newton	Do.	92
*W. Becker	Do.	91
Geo. Lawson	Do.	89
*Quinn's Post Poultry Farm	Do.	87
*T. Fanning	Do.	82
*Mrs. L. Henderson	Do.	82
*G. Williams	Do.	81
*W. and G. W. Hindes	Do.	78
A. J. Anderson	Do.	77
Thos. Eyre	Do.	77
*E. A. Smith	Do.	76
*N. A. Singer	Do.	72
C. M. Pickering	Do.	72
*J. J. Davies	Do.	71
W. D. Evans	Do.	69
*Harold Fraser	Do.	67
*Thos. Taylor	Do.	65
*Dr. E. C. Jennings	Do.	64
*S. McPherson	Do.	60
*Mrs. L. Anderson	Do.	58
*S. W. Rooney	Do.	57
H. P. Clarke	Do.	57
Avondale Poultry Farm	Do.	54
*B. Chester	Do.	51
W. Morrissey	Do.	50
*L. G. Innes	Do.	49
*Range Poultry Farm	Do.	49
S. L. Grenier	Do.	48
C. A. Goos	Do.	47
C. Langsbecker	Do.	45

EGG-LAYING COMPETITION—*continued.*

Competitors.	Breed.	April.
LIGHT BREEDS—*continued.*		
*J. M. Manson	White Leghorns	45
E. Chester	Do.	44
Mrs. R. Hodges	Do.	42
S. Chapman	Do.	40
H. A. Mason	Do.	40
C. H. Towers	Do.	36
Nurse E. M. Ellis	Do.	29
R. C. J. Turner	Do.	25
HEAVY BREEDS.		
*R. Holmes	Black Orpingtons	114
*A. E. Walters	Do.	103
*D. Fulton	Do.	84
*W. Smith	Do.	83
*R. Burns	Do.	81
*Nobby Poultry Farm	Do.	80
*T. Hindley	Do.	80
H. M. Chaille	Do.	73
*A. Shanks	Do.	72
*E. Morris	Do.	67
*R. B. Sparrow	Do.	62
J. Muir	Do.	58
*J. Ferguson	Chinese Langshans	54
*E. Oakes	Black Orpingtons	47
*E. F. Dennis	Do.	40
R. C. Cole	Do.	39
Parisian Poultry Farm	Do.	38
*J. Cornwell	Do.	38
*A. Gaydon	Do.	37
G. Flugge	Do.	30
*E. Stephenson	Do.	21
J. E. Smith	Do.	14
Mrs. G. H. Kettle	Do.	11
Total		4,042

* Indicates that the pen is being single tested.

RESULTS OF SINGLE HEN PENS.

Competitors.	A.	B.	C.	D.	E.	F.	Total
LIGHT BREEDS.							
G. Trapp	20	17	19	16	18	16	106
J. H. Jones	18	18	19	17	20	9	101
Haden Poultry Farm	18	13	21	19	12	15	98
O. W. J. Whitman	15	14	18	13	15	18	93
J. Newton	21	8	18	15	12	18	92
W. Becker	18	19	20	9	9	16	91
Quinn's Post Poultry Farm	19	19	14	13	5	17	87
T. Fanning	8	14	13	14	15	18	82
Mrs. Henderson	9	17	17	10	19	10	82
G. Williams	6	15	16	13	19	12	81
W. and G. W. Hindes	9	15	18	13	7	16	78
E. A. Smith	18	15	15	8	12	8	76

RESULTS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS—*continued.*							
N. A. Singer	18	8	8	17	9	12	72
J. J. Davies	13	13	7	20	4	14	71
Harold Fraser	12	5	14	12	14	10	67
Thos. Taylor	15	14	3	11	8	14	65
Dr. Jennings	5	17	11	8	21	2	64
S. McPherson	13	9	11	11	16	0	60
Mrs. L. Anderson	14	13	7	6	5	13	58
S. W. Rooney	0	1	17	12	11	16	57
B. Chester	16	6	9	10	8	2	51
L. G. Innes	0	15	13	2	19	0	49
Range Poultry Farm	3	16	6	16	3	5	49
J. M. Manson	8	4	20	4	2	7	45
HEAVY BREEDS.							
R. Holmes	22	16	15	14	21	26	114
A. E. Walters	20	20	3	22	18	20	103
D. Fulton	19	20	4	1	19	21	84
W. Smith	19	21	19	21	3	0	83
R. Burns	20	4	21	2	17	18	81
T. Hindley	16	19	17	19	2	7	80
Nobby Poultry Farm	12	21	18	20	9	0	80
A. Shanks	6	5	12	18	10	21	72
E. Morris	6	18	21	0	4	18	67
R. B. Sparrow	16	0	18	18	0	10	62
J. Ferguson	15	10	9	15	4	1	54
E. Oakes	7	19	15	0	6	0	47
E. F. Dennis	3	0	22	0	0	15	40
J. Cornwell	21	17	0	0	0	0	38
A. Gaydon	0	20	7	0	0	10	37
E. Stephenson	12	0	4	5	0	0	21

CUTHBERT POTTS,
Principal.

CHICKEN POX.

Mr. Hindes, late Poultry Expert at the Queensland Agricultural College, some time ago sent to this Journal a recipe for the prevention of chicken pox or warts, truly saying that "Prevention is better than cure."

The disease is caused, in his opinion, by a disordered condition of the blood; it is therefore not advisable to wait until the warts appear, but to see that the blood is kept in good order; the chickens will then readily throw off the warts when they come. They generally appear in about February or March, principally owing to the grass being burnt up by the hot sun, causing a scarcity of green food.

The following will be found to be an excellent recipe for purifying the blood:—Take ½ lb. of liquid extract of sarsaparilla, and ½ oz. of iodide of potassium, and mix with half a gallon of water. Give each chicken half a teaspoonful once a day. If there are a number to be treated a very good plan is to mix it with the pollard, thus giving less trouble. Should the warts break out, touch them with citric ointment, and allow them to dry down to a black scab; this will be ripe in three days, when, if lifted off, it will take with it the little roots of the disease. The affected birds should be removed from the others, as the disease is contagious.

The Orchard.

LEMON GROWING.

Amongst the citrus fruits, the lemon takes a prominent place. The trees thrive admirably, not only on especially suitable soils, but even in indifferent soils if the latter are properly prepared. Both the rough and the Lisbon lemons are heavy bearers. Here we have a sample of the former grown by Mr. W. H. Lambert, Paddington, who obtains a very heavy crop, many of the fruits being in clusters of six, as in the illustration, in a similar way to the grape fruit, to such an extent that the branches were weighed down with them.

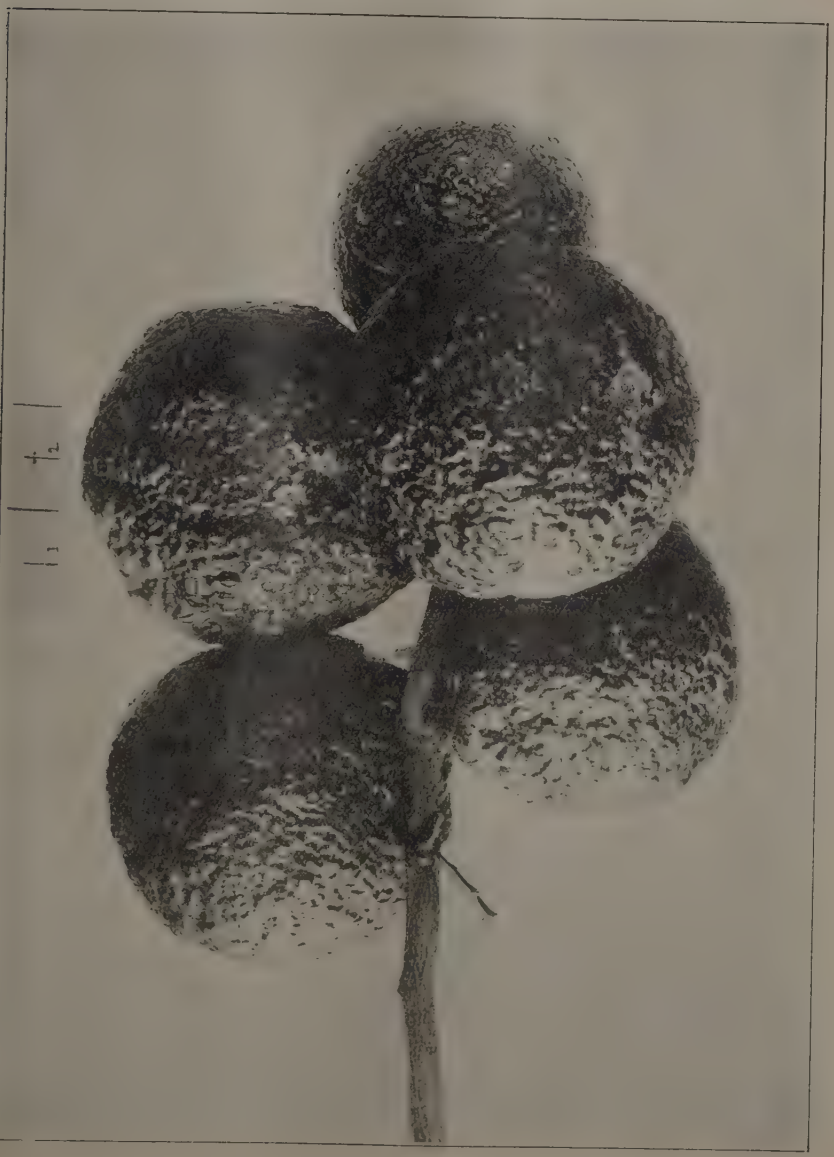

PLATE 17.—CLUSTER GROWTH OF ROUGH LEMONS.

Horticulture.

TOWN PLANNING AND HORTICULTURAL SOCIETIES.

Address delivered at the Monthly Show of the Horticultural Society of Queensland, held in the Albert Hall, Brisbane, 11th May, 1920, by Mr. F. W. Turley, Curator, Queen's Park, Ipswich.

No doubt you have all read the short paragraph on the front page of our monthly schedule. Allow me to read it to you by way of introduction.

"The objects of this society are to encourage and promote the cultivation of plants and flowers, fruits and vegetables, and the holding of monthly shows for the examination and exhibition of plants, &c., and the delivery of lectures in connection with horticultural subjects."

You will agree with me that these are very worthy objects, and I must congratulate the enthusiastic members of this society, some of whom have grown grey in this good work.

This useful hobby has added years to the lives of many people, and, like music and art, it has helped to mellow and sweeten the dispositions of those who have had the good fortune to be brought under its charms.

The displays in this hall are generally a feast for the eyes and are decidedly educational.

The high quality of the plants and flowers, fruits and vegetables, is inspiring and must create in those who view them a desire to emulate the successful and enterprising growers.

Very often new and rare specimens are exhibited and are of especial interest.

Not long ago a very large and varied collection of ferns was sent from the Botanic Gardens—many of them were the choicest varieties in cultivation, and some were seedlings raised in the Gardens. Each plant was named, and this enhanced the value of this very fine exhibit.

The floral work is a striking feature of the monthly shows, and has become a fine art. The colour-blending and general effect is sometimes a "dream."

I am always sorry that so few boys and girls see these beautiful displays.

Many years ago I endeavoured to encourage the system of admitting children to shows, either free or for a very small charge. At any rate, every encouragement should be given to children to visit shows. This may reasonably be calculated to give a love of horticulture for the rest of their lives. There is a great need to educate the children in this direction, as there is only a very small number of young men at the present time who are qualifying for responsible positions in the horticultural world.

But "Town Planning and Horticultural Societies" is my subject this evening.

No matter how much good work has been done by horticultural societies in the past, there is room for improvements and extensions.

With the advance of the science of town planning, horticultural societies will be called upon to play an important part.

During the town planning conference of 1918 this society did very useful work in connection with the judging of gardens and in organising the horticultural display at the Exhibition buildings. This part of the programme will always fall to the lot of societies of this kind.

What I particularly wish to draw attention to is the need for improving the streets and the landscape.

In town planning, everything counts—buildings, streets, gardens, and a variety of details—it includes the useful and ornamental.

Every well-kept garden is an acquisition to the general plan. Every untidy garden is a blot on the landscape.

I strongly favour separate competitions for front gardens and back gardens. It should be understood that the front garden is ornamental and an acquisition to the street. The back garden is for fruit and vegetables. For town planning purposes the front garden is of first importance. For the family the back garden holds premier position.

It may not be out of place to give a prize for the best garden in a street or a locality—taking in several streets—without any need for entering a competition.

As the whole thing is for the improvement of the town or city it would not be too much to ask the local authority or Government to help in the prize-giving.

Many people would have much better gardens if they could get a few hints from some competent person regarding the arrangement of them, and some are not in a position to pay for it. Could horticultural societies do something to help these people, or will town planning authorities supply the need?

The landscape will be improved more or less by each good garden. This applies particularly to a city like Brisbane, where the land is so strikingly undulated. The hills and valleys lend themselves generously to the landscape gardener. Every householder has the privilege of doing his "bit," and the whole thing provides beauty for everybody who has eyes to see. Those who live on the hills look down on the beauties of the valley, and those who live in the valley look up to the grandeur of the hills.

It would be quite a mistake to allow anyone to think that the science of town planning is a new thing. We may not have heard much about it until recent years, but many worthy citizens have been busy at it for many years. Unmistakable evidences abound everywhere. They are to be seen as we travel by train, tram, steamer, or any other way. Positive beauty spots are constantly meeting the eye. Exquisite views are to be met with in and around Brisbane; some cannot be excelled anywhere. In many cases the natural beauties have been added to by enthusiastic citizens, but there is still much unconquered country and many unconquered gardens.

In a climate like our own the possibilities in the realm of horticulture are practically unlimited. The almost endless variety of palms and gorgeous flowering trees and shrubs that can be grown in this part of Queensland makes it a comparatively easy matter to make any garden beautiful.

At last monthly meeting, Mr. Bick gave us some impressions of gardens in the Southern States which were full of interest. Fabulous sums are spent on gardens in those States. Our own State could easily eclipse the other States, provided the same amount of cash was available.

In conclusion I would like to say that my object in writing this paper is to draw attention to the need of encouraging the improvement of gardens generally, and to make them more valuable from a town planning point of view.

It is not necessary to spend a great deal of money in making a garden attractive. If it is planned on economic lines the cost of maintenance can be reduced to a minimum. I have often seen people in starting a home lay out their garden in a style that I was quite sure they would never be able to keep up—while it would have been equally attractive at half the cost.

If properly laid out and well managed, no matter whether it is large or small, your garden will be a source of real pleasure and you will have the satisfaction of knowing that you have done your "bit" towards town planning.

ELEPHANT GRASS—ALGAROBA SEED.

Referring to our articles on Elephant Grass in the last issue of the Journal, Mr. W. Brotherton, Gladstone, writes:—"I am glad to see that interest is still being taken in that excellent fodder plant, Elephant Grass. The photograph shown in last month's Journal depicts the grass left too long uncut. If cut at from 2 to 3 feet high, which height it will attain every month or so, it yields a heavy crop of excellent feed. I have been cutting mine all through the drought, and it is still green although we have had no rain worth mentioning since January last." Mr. Brotherton, Brothertonville, Gladstone, says that he can supply seeds of the Algaroba tree to anyone requiring them.

Tropical Industries.

CANE GRUB INVESTIGATION.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report upon Cane Grub Investigations from the Entomologist, Dr. J. F. Illingworth:—

The continued showers during the past month have done much to improve the appearance of the cane. Though the colour is excellent in most places, the growth is far from satisfactory for this season of the year; it is still necessary to use the scarifiers, because the cane has not closed in sufficiently to keep down the weeds. This does not look very promising for cutting these fields during the season, especially since cool nights are already setting in.

The beetles continued on the wing very late this year at Greenhills—I found them on the feeding trees rather abundant until the 25th of March. This must be a record, for they usually disappear about the 1st of February. Of course, the rains started very late; still, the beetles continued to emerge for a much longer period than is customary for them.

Let me again impress upon the growers that the use of arsenic as a control measure for grubs is still under experimentation. As indicated previously, I am not yet ready to recommend it for extensive treatment. The past season was so unfavourable, due to the continued drought, that I was not able to take advantage of late planting for trying out experiments of placing arsenic in the drill with the plants. I am more and more confident, however, that this method of application will be best. Furthermore, since we have demonstrated that even a large quantity of this non-soluble poison does not appear to have any injurious effect upon the cane plant, I am inclined to use much larger doses—as much as 80 lb. per acre. But even this quantity is comparatively inexpensive if results are assured.

If I can get one more successful growing season I will probably be able to advise more definitely, not only the best method of application, but also the proper amount of the poison to use.

DEVELOPMENT OF *LEPIDIOTA ALBOHIRTA* (GREY-BACKS).

As indicated last month, all stages of the pest were present in the soil at Greenhills at the same time—eggs, first, second, and third stage grubs, and ovipositing beetles. This is a very unusual condition, due probably to the excessively long wait which the beetles were forced to undergo in their pupating chambers.

Usually the majority of the grubs reach the third stage by the end of January; the cane then shows the worst signs of devastation before the end of February. This year, however, the cane is still of good colour on the 15th of April, though the activity of the grubs is showing in the "piping" of the leaves. This rolling-up of the leaves is always noticeable for some time before they begin to turn yellow and die; evidently this is due to the lack of moisture in the plant when the roots are eaten off.

As an indication of the development of the grubs under very favourable conditions as to soil, and so forth, it will be interesting to repeat:—3rd March, only about 10 per cent. had reached that stage; 15th March, between 40 and 50 per cent. had gotten to the second stage, and a very few were in the third or final stage; 29th March, I found 20 per cent. in the first stage, 70 per cent. in the second stage, and 10 per cent. in the third stage; 9th April, less than 1 per cent. were in the first stage, about 74 per cent. in the second stage, and 25 per cent. in the third stage. Hence it will be the end of April before all the grubs reach the third stage.

In the fields where these grubs are so abundant it is encouraging to observe that the parasitic wasps (*Campsomeris* sp.) are rather numerous, the males flying about over the surface of the ground, thus indicating that their mates are destroying the grubs beneath.

ARSENIC FOR GRUB CONTROL.

After observing the apparent lack of success in the fields where I had applied arsenic to the ratoons, by placing it in furrows alongside the stools, I decided upon more drastic treatment, that I might observe the results of arsenic under field conditions, placed right in the spot where the grubs were active. Hence, I lifted a number of stools out bodily, and mixed the poison with the soil before resetting them; the grubs, which averaged 20 per stool, were all returned. In this treatment arsenic was used at the rate of about 80 lb. per acre.

The experiment was started on the 15th of March, then the grubs were pretty well advanced, some even in the third stage. The results were noted by digging out a few of these stools from time to time, and observing the number of dead grubs.

Four days, 14 per cent. dead.
Seven days, 24 per cent. dead.
Ten days, 34 per cent. dead.
Twenty days, 70 per cent. dead.

These results would appear to be very satisfactory from the standpoint of killing the grubs, but, of course, the method of application is not to be recommended. However, if the poison was placed in the drill with the plants, it would be in a similar position to the above—among the roots, whenever the young grubs became active. Then, too, the grubs would probably die much easier, when newly-hatched, if the poison was ready for them at that time; hence they would never reach the destructive stage. In line with this, it is the general experience of economic entomologists that a considerably less dose is required to destroy insects in the very early stages.

I have noted some published criticism, which evidently originates from a lack of experience of general science, stating that in using arsenic for the control of the grubs I will probably poison the cane juice and the sugar, and hence it will be detrimental to the health of the populace. With but little knowledge of chemistry, one would know how easy it is to detect even the smallest quantity of arsenic in a solution. Moreover, we are using arsenic in the insoluble form, which has no apparent action upon the cane plant; and probably lies inert in the soil until eaten by the grubs, when it is acted upon by their digestive juices, rendering it soluble and effective. Furthermore, arsenic that we use for the destruction of trees and other plants is first made soluble by combining with an alkali, such as soda or potash.

THE SUGAR INDUSTRY.

BUNDABERG AND MACKAY.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report from Mr. J. C. Murray, Field Assistant to the Bureau:—

Throughout the month of April the canegrowing areas of Gin Gin, Bingera, and Mackay have been visited.

BINGERA.—This area was at the time of visiting suffering very much from lack of rain, especially on some of the smaller holdings. On the plantation itself the intensive cultivation methods adopted by the management had been having a good effect on that cane which had not received too severe a setback, and should rain fall in sufficient quantities during May or April, the results at the end of the season may not be so disappointing as they look now. However, the management have decided that a vigorous irrigation policy is the only proper course for the future, and with that end in view they are planning accordingly.

Bingera is admirably situated for irrigation, and, although a considerable amount of work of this nature has been done in past years, the company have arrived at the conclusion, and rightly too, that the only successful way to produce sugar on the Burnett is to irrigate. The soil is rich and the danger from frost negligible if water in sufficient quantities could be supplied to the cane before it weakens from want of nourishment.

With regard to cane varieties growing at Bingera, there are no new canes since last visiting this area.

GIN GIN.—Many growers are busy cultivating, and some are planting, but, taking the industry collectively, the uncertainty of the season is causing a good deal of stagnation. As previously mentioned, the Demarara variety seems to be the most

vigorous, it being difficult to say how the other canes will fare towards the winter. No. 1900 is a fair cane at Maroondan. More intensive cultivation would greatly assist the plant crop to resist the dry weather.

MACKAY (Racecourse and Farleigh sub-areas).—Mackay canegrowing areas are not looking nearly so well as they should be at this time of the year. Most of the cane is very backward, especially that growing on the higher land. However, during the month some fine rain has fallen, and this combined with the good growing weather that still prevails, should benefit the cane considerably.

Fertilising and liming are not being done to any extent, probably on account of the high price of the commodities. It costs approximately £5 a ton to obtain burnt lime at Mackay.

Many of the smaller growers are having a hard struggle to carry on, but the general opinion amongst them now is that they will be able to work with a greater measure of success owing to the increased price of sugar.

With regard to the Racecourse area, a great deal depends on how the last July plant crop shapes.

There is practically no standover cane left and the ratoons, what little there are, are very poor. It is probable that the poor ratooning was due to the too rapid growth made by the cane last year, and the stools to a great extent died.

The principal varieties growing are Clark's Seedling, D. 1135, Badila, and 1900 Seedling. These two latter canes are thriving and giving good returns on the rich alluvial flats along the Pioneer, but on the higher land, on the more moderate soils; D. 1135 and Clark's Seedling are more generally grown. Q. 813 is doing well, although mostly it has as yet not had a fair trial. The soil on these Racecourse areas tests with an acid reaction, and could mostly do with a lime dressing. Green manures are very necessary also, the soil being low in vegetable matter in many instances. An outstanding feature of the cane-growing industry here is the high sugar content of the average cane. Clark's Seedling is probably the best tester, farmers frequently getting over 18 c.c.s.

Cane pests are giving very little trouble at present. No serious complaints have been heard in this respect.

On Farleigh conditions are, with regard to crop growth, very similar to those at Racecourse.

Much of the cane is showing the effect of the dry spell, especially the plant crop. Farmers are busy planting at present, the ground being in very fair order after the recent rain. There appears to be a good supply of plants. Farmers now realise the importance of changing their plants, and this is effected as frequently as necessary.

A local farmer, Mr. Hodge, has invented a really excellent implement for loosening the tilth subsequent to planting. Four acres a day can be done, and more effectively than using the hoe. The practice of ploughing in the interspaces between young plant cane is bad, and should be discontinued.

Yuban is being grown by some farmers, but it would probably be a mistake to plant in any way extensively. There are many characteristics about Yuban that do not commend it either to the miller or the cutter.

Field work has been considerably delayed by rain, especially at Sarina, where very little opportunity was afforded for having a detailed visit. However, from what could be observed, the rain will benefit the crops immensely, and there should not be by any means such a low crushing as previously anticipated.

The following varieties are doing well, and still remain the staple ones:—Clark's Seedling, Badila, 1900 Seedling, D. 1135, and H.Q. 285. There is not much of the latter, however. The completion of the railway will greatly benefit Sarina, and make available much good land at present lying idle.

TO COTTON-GROWERS.

It was stated in Farm and Garden Notes for May (in the April issue of this Journal) that an advance of 4d. per lb. would be paid to cotton-growers on delivery of the cotton at the Government Ginnery in Brisbane. This should have read 3d. per lb. When the cotton has been marketed, the Commonwealth Government guarantee that growers will receive a minimum of 4d. per lb., and any additional profit resulting from the sale of the cotton, after marketing and expenses therein, will be divided *pro rata* amongst suppliers.

Botany.

THE WEIR VINE (IPOMÆA CALOBRA).

WITH NOTES ON ITS REPUTED POISONOUS PROPERTIES, BASED ON INFORMATION SUPPLIED BY DONALD GUNN, ESQ., M.L.A.

By C. T. WHITE, F.L.S., Government Botanist.

Description.—A creeping plant, roots producing underground sweet-potato-like tubers. Leaves long-stalked, somewhat heart-shaped, fairly large, sometimes over 4 inches across. Peduncles (flower stalks) about as long as the leaves, bearing several flowers. Flowers about 3 inches long, corolla changing from pinkish red to blue. Seed capsule globose-ovate, ¾ to 1 in. diameter, containing several blackish angular seeds.

Distribution.—It was first collected by the late Walter Hill, one time Government Botanist of Queensland and Director of the Brisbane Botanic Gardens, in the mulga country of the Barcoo River. It is fairly common in the hard red soil (mulga country) of the Maranoa District.

Names.—According to Walter Hill it was known to the aborigines on the Barcoo as "Calobra," and this name was used by Baron Mueller and himself in specifically designating the plant. About 1880, R. Fitzgerald collected specimens of the vine on the Moonie and Balonne Rivers, and in forwarding specimens to Baron Mueller, then Government Botanist of Victoria and the leading authority on the Australian flora, stated that it was known to the aborigines about those rivers as "Weir," and this name seems to have stuck to the plant, it being generally known as Weir Vine in the Maranoa District, with the occasional variant of "Gueeah Vine."

Properties.—Up to the present the only fact I can find recorded about the plant is that the aborigines wherever it grew used the tubers as food. In December of last year, however, Mr. Donald Gunn, M.L.A., brought in specimens to this Department with the account that "When sheep ate the vine they developed the symptoms of indigo-affected animals; they had a wild-staring look, with their eyes almost coming out of their heads. The plant grows in the red soil (mulga country) between Goondiwindi and St. George, and has a large handsome flower of the convolvulus type, changing from pinkish red to deep blue. The tubers or yams it produces grow at times to the size of one's hat." As such information was quite new to me, I asked Mr. Gunn if he was quite sure of the poisonous character ascribed by him to the vine. He replied in the affirmative and stated that his account could be corroborated by other practical stockmen, and, further, kindly forwarded on the following letter from his son, Mr. Donald D. Gunn, written from Quibet, Roma, under date 18th February, 1920:—

"Particulars of the 'Weir Vine,' which is the only name by which I know the plant:—This plant comes up as soon as heavy rain falls. The potato, yam, or whatever you like to call it, will keep in the ground for months, and, as soon as rain falls, comes up and grows quicker than any grass. It grows something like a sweet-potato plant and has a large, lily-like flower. Later on, when the flower falls off, a gherkin-like pod is left, which holds the seed. When the plant first comes up, stock can eat it and they will fatten on it. It is the pod that does the harm to stock; at least, that is my opinion. The plant affects stock something like the 'Darling Pea.' Cattle will try to catch their tails, and go dim in the eyes. I have only had a few affected with it, and I have been amongst it for nine years, so it is not very deadly. Horses that take to it 'go' in the eyes, try to climb trees, rear up, &c. Sometimes they 'go' in the loins; the same with cattle, and if they do, that is the end of them. The yam can be used as a potato. I know a woman who

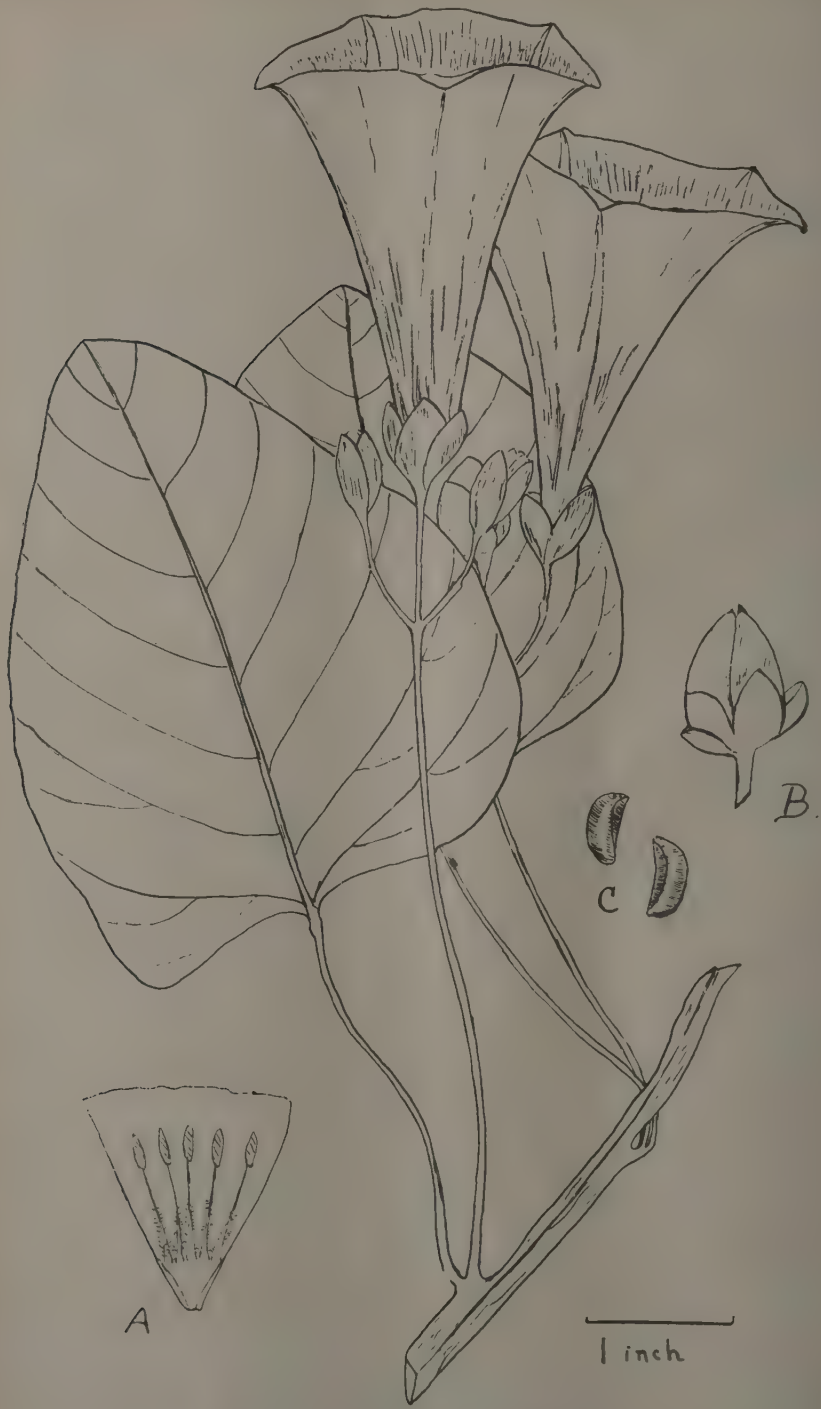

PLATE 18.—WEIR VINE (*Ipomœa calobra*).
A. Base of corolla laid open to show stamens. B. Capsule. C. Seeds.
The whole reduced to the same scale.

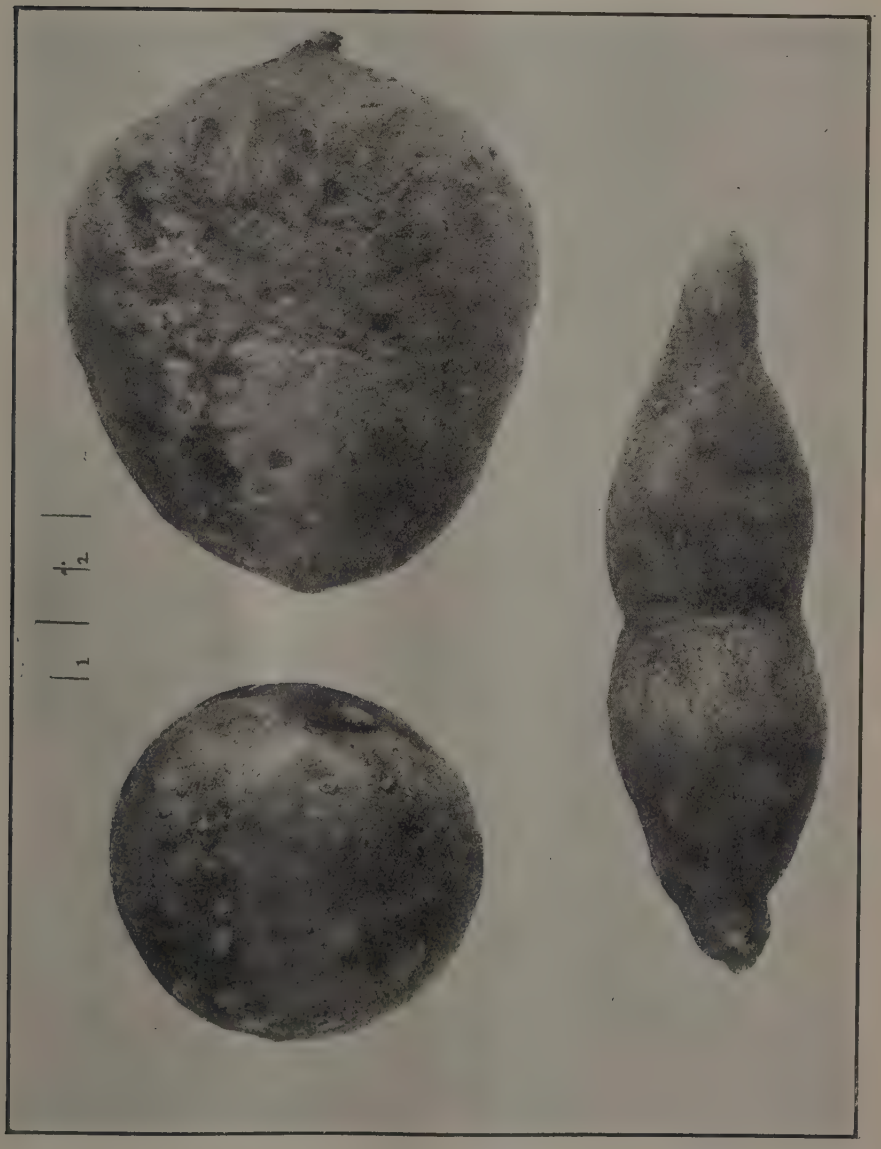

PLATE 19.—TUBERS OF THE WEIR VINE (*Ipomœa calobra*).
The measurement alongside represents inches and half-inches.

used to boil the young and tender ones and use them the same as potatoes, and she told me that they were not bad eating. The only way I have eaten them is to dig up the yam and suck the juice out as a substitute for water. One need never die of thirst where the Weir grows. If there are no growing plants, have a look round and you will find the ground cracked and fissured with the fissures radiating outwards; dig down and you will get the yam, sometimes only a foot under the surface, and sometimes deeper. When the yam gets very old it dies and leaves a hollow in the ground under the surface. If you ride over the spot after rain when the ground is soft and your horse puts his foot down over the hole, he will go straight down up to his knees or thereabouts and leave a nasty trap for the next man. I have had several falls through the presence of these holes.''

Notes on the Genus.—The genus *Ipomœa* is a large one, widely spread over the world. About forty species are natives of Australia, and nearly all the Australian species occur in Queensland, though they may extend to the other States and, in some cases, have a wide geographical distribution beyond the continent. The genus includes most of the plants that are grown in gardens under the name of ''convolvulus'' or ''Morning Glory.'' It also includes the sweet potato. Some of the species possess purgative properties, as the roots of *Ipomœa purga*, the source of jalap. The seeds of other species, *e.g.*, *Ipomœa nil*, *I. hederacea*, &c., also contain a principle resembling jalap in its action. The leaves of some, *e.g.*, *I. batatas*, develop at times hydrocyanic (prussic) acid yielding glucosides, and losses among stock are sometimes thereby caused by them, but the symptoms of prussic acid poisoning would be quite different to those described by Mr. Gunn, which are those generally ascribed to species of *Swainsona* (Darling pea and indigo) in Australia, and *Astragalus* (loco weeds) in the United States, and other leguminous genera, and, so far as I can find, has not been recorded for any species of *Ipomœa* or other genus of the family Convolvulaceæ.

NEGLECTED INDUSTRIES.

PETROLEUM OIL NEAR BRISBANE.

We are pleased to know that active steps are being taken to prove the accuracy of Mr. Arthur Morry's theory that petroleum oil exists in enormous quantities in the metropolitan district, and at a depth that will bring it well within commercial reach. Mr. Morry has secured a license to prospect on 60 acres of what is known as the Abattoirs Reserve at Wolston, and a small company is being formed to undertake boring operations at once. Should success be obtained, it is impossible to overestimate the importance of the new industry to Brisbane and, in fact, to the State generally. A large number of local industries will be immediately benefited, commercial and shipping circles will enter upon a new life, and capital will flow into the State in abundance. Mr. Morry's optimism appears to be perfectly justified, as he brings an extensive and varied experience of scientific and professional practice to bear upon the subject, while his very strong opinions are backed up by the results of extensive original research work in several industries. He contends that all the favourable indications which are found in other large oil fields are apparent here.

It is known that, while oil may be found in all geological formations, the newest and oldest groups afford the largest supplies, and that all the largest oil fields of the world hitherto discovered are known to be in the tertiary formation, which is abundant in Southern Queensland; besides, Mr. Morry has also adopted some original methods of his own in calculating the position, depth, and thickness of the various oil strata. It is sincerely hoped that great success will attend his efforts, and every encouragement should be given to him in his earnest efforts to develop the resources of the State.

We understand Mr. Morry has also located an important rock salt deposit not more than 120 miles from Brisbane, and this, too, may become a very welcome and important addition to our Queensland industries.

Forestry.

HOW FARM FORESTRY PAYS.

Farm forestry may be said to be the handling of forest trees and woodlands in such a manner as to increase the income and the permanent value of the farm. This phase of forestry has never interested the "man on the land" in Queensland. Clearing off the timber by the firestick and ringbarking on large areas have been the main objects of farmers and graziers for the past fifty years.

As a contrast, let us see what the "Farmers' Bulletin," issued by the United States Department of Agriculture, has to say on the subject:—

"Farming in the Southern States has progressed to the point where farm owners are interested in conserving all the resources of the farm instead of allowing some of them to be wastefully handled. Young trees are generally recognised to be the foundation for the future crop of timber, and worth considerable care and attention. Now that the original growth of pine and the largest and most valuable hardwoods are nearly all gone from the farms, old-field pine and second-growth timber compose the woodlands and are the subjects of chief interest. Rapid-growing kinds of trees are favoured and, as a rule, slow-growing trees are being eliminated.

"Valuable and useful trees on the farm are a sort of savings bank account, which, if rightly handled, may be drawn upon each year without reducing the principal. Since timber and wood are required for the successful operation of a farm, and since most farms have more or less rocky, steep, wet, or poor soil, that is best adapted to tree growth, the handling of woodland is legitimately a part of farm work.

"In addition to the value of the home forest as a source of direct income to the farmer each year, there is another way in which it has a very distinct worth. Woodland and trees scattered about the farm undoubtedly increase the value of the place to a much greater extent than the actual selling value of the standing timber. Belts of woodland protect the growing crops, as well as the live stock and man, from cold or parching winds. Trees should be maintained on every farm not only as a source of income but also because they make living on the farm itself and in the community more comfortable and attractive.

"The forest lands held by farmers in the Southern States constitute a total of about 124,000,000 acres, which is more than one-third (35 per cent.) of all the farm lands of that section.* It may surprise some to know that farm woodlands represent more than one-half of the entire forest land in the Southern States, including the great holdings of the lumber companies, and yield annually about 94,000,000 dollars worth of timber products.† Of this amount nearly one-half is sold in the form of logs, other cut products, and as standing timber. The remainder is used on the farm."

THE COTTON SEASON.

It is requested that cotton growers will consign their crops to the departmental ginnery as early as possible in the coming season. If farmers having small crops would combine to forward the produce, a considerable saving in freight and cartage can be effected.

* The States referred to in this group include the 15 which follow: Maryland, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida (26 northern counties only), Alabama, Mississippi, Louisiana, Arkansas, Oklahoma, and Texas. The figures given in this bulletin are based upon the last U. S. Census (1910), the latest information available.

† Value of timber products in 1919, on account of enhanced values and probable increased cut, estimated at about 140,000,000 dollars.

Entomology.

NOTES ON A LITTLE-KNOWN LEAF-EATING AND STEM-BORING BEETLE.

By E. JARVIS, Assistant State Entomologist.

A rather interesting infestation of a small patch of third ratoons by the chrysomelid beetle *Rhyparida morosa, Jac.*, was observed by the writer on 19th January, 1920, at Pyramid, in the Cairns district.

This insect, which was described and figured for the first time as a cane pest in 1916, is about a quarter of an inch long, of very convex shape, and uniformly black and shining, occasionally with a bronze tint. Its head is hidden nearly to the eyes in the prothorax, and the antennæ are reddish-brown with eleven joints of about equal length, the first five lighter in colour, more slender, and less hairy than the remainder. The prothorax and elytra are punctate, the former irregularly and finely, the latter coarsely, with punctures arranged in curved lines as indicated on drawing; scutellum semi-circular. Length, 6 m.m.; greatest width, 4 m.m.

HABITS OF THE BEETLE.

During the heat of the day these beetles may be found resting deep down between unfolding heart-leaves, and if disturbed usually run upwards, seeking to escape by crawling outside and taking to wing. At such times, however, one can often catch them with the fingers, as they do not attempt to fly until getting clear of the centre of the plant. The presence of this pest is at once betrayed by the characteristic appearance of the damaged leaf-blades (see fig. 5), which does not in the least resemble grasshopper injury. Like many of our small plant-eating beetles, the species in question feeds mostly during the cooler hours, dropping hastily from the leaves or taking flight when approached. At 7.15 a.m. 22nd January, on a cloudy morning, they were observed crawling over and eating holes in cane leaves at Pyramid, while later in the day, the sky still being overcast, specimens were noticed feeding in a similar manner on the leaves of "blady-grass" (*Imperata arundinacea*), the native food-plant of this insect.

Specimens confined in cages containing growing cane plants feed in a normal manner, three beetles during a period of four days being able to severely cripple a plant about 15 inches high.

The adult beetles are somewhat gregarious in habit, and often occur in clusters of twenty or more, side by side, on the ends of young twigs of *Ficus opposita*.

MODE OF INJURY.

After glancing at the accompanying photographs (figs. 4, 5, 6), the reader will in future no doubt be able to recognise the presence of this pest among his cane. Figures 4, 4, 4 are taken from cane leaves attacked by caged specimens of *morosa*; fig. 5 from leaves eaten by this species in the field; while figs. 6, 6 are photos of damaged "blady-grass."

The infestation at Pyramid extended more or less throughout the area affected. A number of plants had suffered considerably, many of the leaves in such cases being somewhat ragged-looking and edged with fragments of dead brown tissue, representing such portions of the leaf-blade lying between large holes as had been cut off from the usual supply of moisture, and consequently dried up.

HABITS OF THE LARVA.

The grub of this species was discovered under rather peculiar circumstances. On 7th January, whilst studying the economy of our smaller moth-borers of cane, one of the many "dead hearts" examined was found to contain a coleopterous larva which had eaten a central tunnel about three-quarters of an inch long at the base of the sucker. This grub was placed in a cage containing damp soil, into which it at once burrowed, and nine days later had pupated in an egg-shaped chamber at a depth

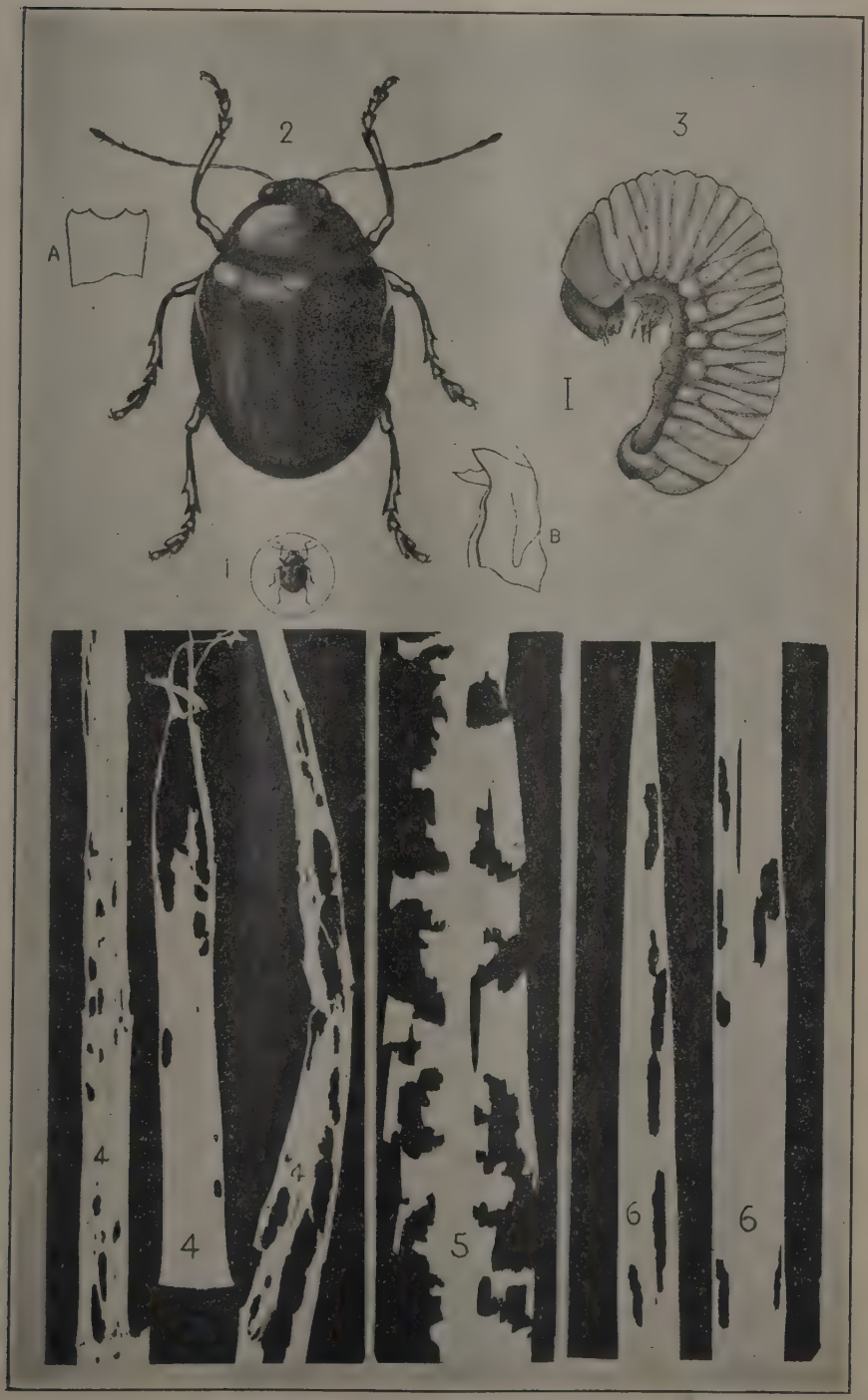

PLATE 20.—RHYPARIDA MOROSA, *Jac.* (Family CHRYSOMELIDÆ).

of about one and a-half inches. By 25th January (an interval of nine days), transformation to the imago stage was effected, the beetle, which proved to be *Rhyparida morosa*, then being of the normal bronze-black colour and able to fly.

Three days earlier, however (on 22nd instant), happening to notice a patch of "blady grass" at Pyramid affected by some borer, I was interested to find the insect in question the responsible agent, and, moreover, that it occurred quite commonly in the succulent underground portions of the stalks of this plant.

Upon tearing off the loose brown basal sheathing of affected stems, a hole in the side about one-sixteenth of an inch in diameter was exposed, out of which before many seconds a grub, if at home, usually emerged tail foremost, and endeavoured to escape. By the aid of its spined tarsi and several transverse rows of abdominal bristles this larva is able to crawl over level ground rather quickly.

A number were transferred to breeding cages, and in due time produced specimens of *Rhyparida morosa, Jac.*

The above incident appears worth recording, since it serves to illuminate the life history of an insect which, although at present of minor importance as a leaf-eating beetle, has now been found capable of inflicting more serious injury to cane during its larval condition. In all probability a certain percentage of young ratoon suckers growing close to the headlands or road sides covered with "blady grass" are often killed by this insect.

Description of Larva (Fig. 3).

General colour yellowish-grey, a faint indication of a whitish median band; head shining reddish-brown, mouth parts darker; prothoracic plate large, pale shining yellow; stigmata protruding slightly, light pink, the outer edge forming a dark-red circle; venter of five terminal abdominal segments with transverse rows of stiff brown bristles. Surface of body finely granulate; legs rather long, terminating in a sharp brown curved claw; tibiæ with about three stout bristles on ventral portion. Length in natural doubled-up position, 4.50mm. (three-sixteenths of an inch).

Description of Pupa.

At first whitish-yellow but gradually darkening from sixth to ninth day. Body sprinkled sparingly with brown hairs seated on conical tubercles; distal extremity of hind femora with *one*, and obtuse point of anal segment with *two* rather large brown thorn-like claws. Length, 4 m.m. (nearly three-sixteenths of an inch).

At present this insect, being of minor importance, does not call for repressive measures.

It is probably preyed upon by many natural enemies, one of which is an "Assassin bug" (Reduvfidæ), that is predaceous upon the adult beetle. From a larva obtained 30th January, I bred a Tachinid fly (undetermined) which emerged 18th February.

Reference to Plate.

1. *Rhyparida morosa, Jac.* (natural size).
2. The same (magnified). A. Labrum of same. B. Mandible of same (magnified).
3. Larva of same (magnified).
4. Injury to cane leaves (from pot plant).
5. Injury to cane leaves (from cane field).
6. Injury to leaves of "blady grass."

Drawings and Photos original.

MANURING COW PEAS.

A cowpea crop of 15,000 lb. of green vines per acre will contain 100 lb. of nitrogen, 67 lb. of potash, and 22 lb. of phosphoric acid. Therefore, three times as much potash as of phosphoric acid will be required. The plant draws its nitrogen from the air, therefore only phosphoric acid and potash need be supplied directly.

General Notes.

A REAL NON-SKID TYRE.

In the March issue of the publication of the "Industrial Publicity Service," London, amongst many interesting items is one describing a reliable non-skid rubber tyre. Legions of inventions have been made to prevent the skidding of rubber tyres, but no one device can be said to be completely satisfactory, either in obviating side-slip or in avoiding damage to the roadway and to the tyre itself. Chains, studs, and all sorts of rubber protuberances have been tried without real success. A British engineer has, however, been working along much simpler and more scientific lines with most promising results. His notion is to shape the tyre so that when it is in contact with the road it lies flat, with a definite edge on each side. Any tendency to skid is resisted by the "squeegee" action of the tyre in this position. Trials have shown that incipient side-slips are quickly checked, and that the tyre wears well, and has no bad effect on road surfaces.

TANNING MARSUPIAL AND OTHER SKINS.

Since the opening of the present season for trapping opossums we have received numerous letters asking for instruction in curing and tanning these and other skins. Perhaps the following recipes will prove satisfactory. The general principle is to trim off the useless parts of the skins and remove all fat from the inside. Then soak the skins in warm water for about an hour. Then apply a coating of borax, saltpetre, and Glauber's salts—1 oz. of each, dissolved in sufficient water to make a thin paste. On the following day, give a coating of a mixture of 1 oz. of sal. soda, ½ oz. of borax, and 2 oz. of hard soap. This latter mixture should be slightly heated without allowing it to boil. After this, fold the skin together and leave in a warm place for 24 hours. Then take 4 oz. of alum, 3 oz. of salt, and 2 oz. of saleratus; dissolve these in hot water, and when cool soak the skin in it for twelve hours. Wring out, and hang up to dry. If you find the skin not sufficiently soft, repeat the soaking and drying two or three times.

Another method is, first to remove the flesh and fat. Then wash the skin in a solution of sal. soda and water. Take 4 oz. of powdered alum, 8 oz. of salt, 1 quart of new milk to 4 gallons of salt water, and 1 pint of prepared starch. Stir well, and then put in your fur skins. Air them often by hanging them over a stick laid across your tan tub. Handle this occasionally until they have been in the liquor for a day or two. Then remove the skins and add to your liquor a *half* teaspoonful of sulphuric acid. Stir this well into the liquor. Put the skins back and steam them well for about an hour. Then take them out and wring and rinse off in soft, luke-warm water, and hang them up in a cool place, and when they begin to get white work and stretch them till they are dry.

Hides of larger animals, such as kangaroos, calves, &c., should remain longer in the solution.

To cure a tough skin, trim it on the flesh side with a sharp knife and then well brush with a solution of 2½ lb. of alum and 1 lb. of common salt in 1 gallon of warm water. The skin should be treated two or three times with this solution on successive days. Now sprinkle bran all over the skin, brush out, and nail the skin to a board to dry it.

Note that each kind of skin requires some special treatment, that is, all skins cannot be tanned in the same manner. But the general principle is the same as above.

Still another method is by what is known as "the lightning tanning process," which is said to be the quickest method of tanning wallaby, rabbit, and other skins, and is very simple. It is as follows:—Pour five or six quarts of boiling water over two quarts of bran, and then strain the infusion. Make an equal quantity of salt water, by adding to blood-warm water as much salt as it will dissolve. Mix the bran and salt water, and to each gallon of the mixture (when no more than luke warm) add an ounce of sulphuric acid ($H_2 SO_4$). Immerse the skins in the liquor, stirring them occasionally until tanned, which will be in about twenty minutes. When tanned, rinse in clean water and hang out in a shady place to dry. Pull and stretch them well while drying. By sufficient pulling they can be made quite white. Dry skins should be soaked in warm water before tanning till they are quite soft and white.

CHEMICAL TREATMENT OF TREE STUMPS.

A correspondent writing to the "New Zealand Journal of Agriculture" (April 20) asked for advice as to the procedure for dissolving large stumps and kauri leads with sulphuric and nitric acid. To this the "Fields Instruction Branch" replies:—

"We would suggest as an alternative treatment the use of nitre (potassium nitrate) as sulphuric acid is now quoted at £22 a ton, and nitric acid, which is difficult to procure at the present time, is much more expensive. Bore a number of 2-inch holes into the stumps to a depth of about 6 inches and plug them with nitre. After a week the whole stump may be fired and the residual ash will remain as a fertiliser. The nitre disseminates through the stump, and will cause it to burn readily."

[The kauri is a soft-wood tree. We cannot say whether the above process would prove effective in the case of our Queensland hardwood stumps or trees, such as ironbark, gum, and other eucalypts.—ED. "Q.A.J."]

COTTON-GROWING SCHEME FOR INDIA.

An American Journal states:—In order to develop the best qualified cotton lands to a degree sufficient to produce the fibre in the quantities proportionate to the average, Great Britain looks to India, as the best field for improvement, and the plan of development has been laid before an American firm, which is considering the undertaking.

The plan under consideration calls for the expenditure of 70,000,000 dollars, and the construction of 5,000 miles of canals; an engineering task that will consume eight or ten years to complete.

It is proposed to conduct this great irrigation undertaking in the Sind Province, near the city of Sikkur, where already a dam more than a mile long is under construction to impound the waters of the Indus, and turn them into the canal system.

The size of the undertaking may be understood, when it is to include one canal 200 miles long; another 80 miles long; one 34 miles, one 25 miles, one 40 miles, one 16 miles, and one 11 miles. These main streams will supply small canals of various lengths, which will conduct the water throughout the entire area to be devoted to cotton, so that with the favourable climate and the aid of irrigation when necessary the success of the crop would always be a certainty.

These canals, especially the large main streams, will be deep and wide enough for light craft, which will include a fleet of light-draught steamers which will transport the cotton from the presses to Sikkur, and thence to the nearest seaport, Karachi.

Answers to Correspondents.

CORN-COB GRINDING MACHINE.

G. WOLFE, Netherdale—

We have made inquiries with respect to the corn-cob grinding machines, and understand that they can be procured from Messrs. Smellie and Co. and from the International Harvester Coy., Brisbane.

The Markets.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY, 1920.

Article.		MAY. Prices.
Bacon	lb.	1s. 5d.
Bran	ton	£19
Broom Millet	„	£45 to £56
Broom Millet (Sydney)	„	£50 to £55
Butter (First Grade)	cwt.	200s. 8d.
Chaff, Lucerne	ton	£14 to £17 10s.
Chaff, Mixed	„	£13 to £15
Chaff, Oaten	„	£13 10s. to £17
Chaff, Wheaten	„	£16
Chaff, Panicum	„	£12 to £13 10s.
Cheese	lb.	1s. to 1s. 3½d.
Flour	ton	£19 10s.
Hams	lb.	1s. 8d. to 1s. 11d.
Hay, Lucerne	ton	£14 5s.
Hay, Oaten	„	...
Honey	lb.	7d. to 7½d.
Maize	bush.	10s. to 11s.
Oats	„	...
Onions	ton	...
Peanuts	lb.	6d. to 7d.
Turnips (Swede)	ton	£16 10s.
Pollard	„	£14
Potatoes	„	£14 to £15
Potatoes (Sweet)	„	10s. to 10s. 3d.
Pumpkins (Cattle)	„	£9 10s. to £10
Eggs	doz.	2s. 6d. to 3s. 11d.
Fowls	per pair	5s. to 9s.
Ducks, English	„	4s. 6d. to 5s. 6d.
Ducks, Muscovy	„	7s. 6d. to 9s.
Geese	„	7s. 6d. to 10s.
Turkeys (Hens)	„	10s. to 14s.
Turkeys (Gobblers)	„	£1 16s. to £2.
Wheat	bush.	10s. 6d. to 11s.

VEGETABLES—TURBOT STREET MARKETS.

Beans, per sugar-bag	8s. to 16s.
Beetroot, per dozen bunches	9d. to 1s. 6d.
Cabbages, per dozen	2s. 6d. to 12s.
Carrots, per dozen bunches	1s. 9d. to 3s.
Cucumbers, per dozen	3d. to 1s. 9d.
Lettuce, per dozen	9d. to 1s. 6d.
Marrows, per dozen	2s. 6d. to 8s.
Peas, per sugar-bag	2s. 6d. to 16s.
Potatoes (Sweet), per sugar-bag	4s. to 8s.
Pumpkins (table), per sack	9s. 6d. to 10s. 3d.
Tomatoes, per quarter-case	3s. to 5s.
Turnips (Swede), per cwt.	16s. 6d.

SOUTHERN FRUIT MARKETS.

Article.	MAY. Prices.
Bananas (Tweed River), per double-case	17s. to 18s.
Bananas (Fiji) per double-case	18s. to 22s.
Bananas (Queensland), per double-case	14s. to 20s.
Lemons (Victorian), per case	9s. to 13s.
Mandarins, per case	12s. to 15s.
Oranges (N.S.W.), per case	9s. to 12s.
Oranges (Navel), per case	14s. to 16s.
Passion Fruit (Victorian), per case	15s. to 23s.
Pineapples (Queens), per double-case	15s. to 18s.
Tomatoes (prime), per quarter-case	4s. to 10s.

PRICES OF FRUIT—TURBOT STREET MARKETS.

Apples, Eating, per bushel-case	7s. 6d. to 13s.
Apples, Cooking, per bushel-case	7s. to 12s.
Bananas (Cavendish), per dozen	4½d. to 1s.
Bananas (Sugar), per dozen	2d. to 10d.
Citrons, per cwt.	13s. to 15s.
Cocoanuts, per sack	£1 5s.
Custard Apples, per quarter-case	7s. 6d. to 16s.
Grapes, per lb.	..
Lemons (Lisbon), per half bushel-case	3s. 6d. to 12s.
Mandarins, per case	5s. to 15s.
Oranges, per case	5s. to 13s.
Oranges (Navel), per case	12s. to 13s.
Papaw Apples, per case	2s. to 16s.
Passion Fruit, per half bushel-case	4s. to 8s.
Peaches, per quarter-case	...
Pears, per quarter-case	12s. to 17s. 6d.
Pineapples (inferior), per case	9s.
Pineapples (Smooth), per case	5s. to 15s.
Pineapples (Ripley), per case	...
Rosellas, per sugar-bag	4s. to 5s. 6d.
Tomatoes (prime), per quarter-case	2s. to 5s.

TOP PRICES, ENOGGERA YARDS, APRIL, 1920.

Animal.	APRIL. Prices.
Bullocks	£29 5s. to £26 15s.
Bullocks (Single)	...
Cows	£12 to £14 10s.
Cows (Single)	£16 5s.
Merino Wethers	37s. 3d.
Crossbred Wethers	42s. 9d.
Merino Ewes	26s. 3d.
Crossbred Ewes	47s. 6d.
Lambs	37s. 6d.
Pigs (Backfatters)	...
Pigs (Light Bacon)	...
Pigs (Porkers)	63s.

Orchard Notes for July.

THE SOUTHERN COAST DISTRICTS.

The notes for the month of June apply to July as well. The first crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf-blight, and spray for same with Bordeaux mixture, also watch for the first signs of the grey mould that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer, that eats the roots of strawberries, should be looked for, and destroyed whenever found. Pruning of citrus and other fruit trees may be continued; also, the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunk or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a wisp of grass, as they are injured not only by frost but by cold westerly winds.

THE TROPICAL COAST DISTRICTS.

Keep the land well cultivated—plough when necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the Spring crop of fruit. This applies not only to oranges and other tree fruits, but to bananas and pines as well. A good start in spring means good bunches of bananas and early-ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit; but where citrus trees are heavily loaded, the pruning should be put off till after the spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the sulphide of soda wash should be used as well.

THE SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop—both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month; if possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, when the earlier planted trees, which have had a longer time to become established, will do all right—provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Do not neglect to cut back hard when planting, as the failure to do so will result in a weakly growth.

As soon as the pruning is completed, the orchards should get their winter spraying with the sulphur limewash, and either with or without salt, as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of canker, bark-rot, moss, lichens, &c.

Where the orchard has not been ploughed, get this done as soon as the pruning and spraying are through, so as to have the land in good order for the spring cultivations. See that the work is well done, and remember that the best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties

that are of proved merit in your district; do not plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is then practically checked, and the young lucerne plants will, therefore, not be choked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time weeds once more appear it will be well able to hold its own against them. From 10 to 12 lb. of seed will be sufficient for an acre. This is also the time to prepare the land for many field crops, such as potatoes, maize, oats, and barley for green fodder; also rye, vetches, tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes during this month in any districts liable to late frosts or in low-lying ground. Under such conditions, it is far better to wait until well into the following month. The greatest loss in potatoes and sugar-cane has been, on more than one occasion, experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, salsify, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, holly-hocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

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ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

1920.	MAY.		JUNE.		JULY.		AUGUST.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·14	5·16	6·31	5 0	6 39	5·3	6·30	5·18
2	6·14	5·15	6·32	5·0	6·40	5·4	6·29	5·19
3	6·15	5·15	6·33	4·59	6·40	5·4	6·29	5·19
4	6·15	5·14	6·33	4·59	6·40	5·4	6·28	5·20
5	6·16	5·14	6·33	4·59	6·40	5·5	6·27	5·20
6	6·17	5·13	6·34	4·59	6·40	5·5	6·27	5·21
7	6·17	5·12	6·34	4·59	6 40	5·5	6·26	5·21
8	6·18	5·12	6·34	4·59	6·40	5·6	6·25	5·22
9	6·18	5·11	6·35	4·59	6·40	5·6	6·24	5·22
10	6·19	5·10	6·35	4·59	6·40	5·6	6 23	5·23
11	6·19	5 9	6·35	4·59	6·39	5·7	6·23	5·23
12	6·20	5·8	6·36	5·0	6·39	5·7	6·22	5·24
13	6·21	5·8	6·36	5·0	6·39	5·8	6·21	5·24
14	6·21	5·7	6·36	5·0	6·39	5·8	6·20	5·25
15	6·22	5·6	6·36	5·0	6·38	5·9	6·19	5·26
16	6·22	5·6	6·37	5·0	6·38	5·9	6·18	5·26
17	6·23	5·5	6·37	5·0	6 38	5·10	6·17	5·27
18	6·23	5·5	6·38	5·0	6·37	5·10	6·16	5·27
19	6·24	5·4	6·38	5·0	6·37	5·11	6·16	5·28
20	6·25	5·4	6·38	5·0	6·36	5·12	6·15	5·28
21	6·25	5·4	6·39	5·0	6·36	5·12	6·14	5·28
22	6·26	5·3	6·39	5·0	6·35	5·13	6·13	5·29
23	6 26	5·3	6·39	5·1	6·35	5·13	6·12	5·29
24	2·27	5·3	6·39	5·1	6·34	5·14	6·11	5·30
25	6·28	5·2	6·39	5·2	6 34	5·14	6·10	5·30
26	6·28	5·2	6·39	5·2	6·33	5·15	6·9	5·30
27	6·29	5·2	6·39	5·2	6·33	5·15	6·8	5·31
28	6·29	5·1	6·39	5·3	6·32	5·16	6·7	5·31
29	6·30	5·1	6·39	5·3	6·32	5·16	6 6	5·32
30	6·30	5·1	6·39	5·3	6·31	5·17	6·5	5·32
31	6·31	5·1	...	...	6·31	5·17	6·4	5.33

PHASES OF THE MOON, ECLIPSES, &c.

(The times stated are for Queensland, New South Wales, and Victoria).

			H.	M.	
3 May	○	Full Moon	11	47	a.m.
11 „	☽	Last Quarter	3	51	p.m.
18 „	●	New Moon	4	24	p.m.
25 „	☾	First Quarter	7	7	a.m.

Apogee on 7th at 6 a.m. Perigee on 19th at 4 p.m. The Moon will be totally eclipsed on the 3rd at midday, but will not be visible in Australia. It will cause a partial eclipse of the Sun on the 18th, visible in parts of Queensland about sunset.

2 June	○	Full Moon	3	18	a.m.
10 „	☽	Last Quarter	4	58	a.m.
16 „	●	New Moon	11	41	p.m.
23 „	☾	First Quarter	4	49	p.m.

Apogee on 3rd at 2·30 p.m. and on 30th at 5 p.m. Perigee on 17th at 1·12 a.m. The Moon will occult Mars and Spica on the 25th, not visible in Australia unfortunately, but on the 28th the occulation of a small star in the Scorpion about 6 p.m will be an interesting sight in small telescopes and binoculars.

1 July	○	Full Moon	6	41	p.m.
9 „	☽	Last Quarter	3	5	p.m.
16 „	●	New Moon	6	25	a.m.
23 „	☾	First Quarter	5	20	a.m.
31 „	○	Full Moon	9	19	a.m.

Perigee on 15th at 10·24 a.m. Apogee 28th, 12·24 a.m.

7 Aug.	☽	Last Quarter	10	50	p.m.
14 „	●	New Moon	1	44	p.m.
21 „	☾	First Quarter	8	52	p.m.
29 „	○	Full Moon	11	3	p.m.

Perigee on 12th at 3·48 p m. Apogee on 24th at 2·36 p.m. On the 8th and 9th of August the planets Venus and Jupiter will appear to be in juxtaposition, but will be too near to the Sun to be seen to much advantage without a telescope or binoculars. They will be about ten degrees south-east of the Sun.

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S. —add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

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20

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF APRIL IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING APRIL, 1920 AND 1919, FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1920.	April, 1919.
North Coast.	In.		In.	In.
Atherton	4·34	19	4·03	5·91
Cairns	11·81	38	19·37	17·76
Cardwell	9·88	48	15·32	13·09
Cooktown	9·20	44	14·49	3·63
Herberton	4·26	33	2·63	2·61
Ingham	8·82	28	20·11	13·77
Innisfail	22·56	39	31·33	20·52
Mossman	11·68	12	25·84	17·28
Townsville	3·68	49	18·47	2·79
Central Coast.				
Ayr	2·77	33	11·30	3·85
Bowen	3·02	49	1·73	2·77
Charters Towers ...	1·76	38	4·68	3·81
Mackay	6·90	49	8·74	9·13
Proserpine	6·96	17	8·32	11·14
St. Lawrence ...	2·93	49	0·78	3·43
South Coast.				
Biggenden	1·71	21	1·42	2·26
Bundaberg	2·81	37	1·53	1·53
Brisbane	3·58	69	2·00	1·99
Childers	2·36	25	0·61	0·92
Crohamhurst ...	5·49	27	6·33	7·13
Esk	2·64	33	2·25	1·66
Gayndah	1·34	49	0·76	2·10
Gympie	3·10	50	1·93	3·57
Glasshouse M'tains	4·70	12	6·71	4·88
Kilkivan	2·08	41	1·28	1·35
Maryborough ...	3·26	49	2·41	2·49

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	April.	No. of Years' Records.	April, 1920.	April, 1919.
South Coast—continued:	In.		In.	In.
Nambour	4·76	24	6·36	7·46
Nanango	1·86	38	2·17	1·38
Rockhampton ...	2·35	33	1·39	4·93
Woodford	4·12	33	3·78	3·27
Darling Downs.				
Dalby	1·30	50	0·34	0·84
Emu Vale	1·22	24	0·90	0·53
Jimbour	1·36	32	0·33	0·59
Miles	1·49	35	0·22	1·59
Stanthorpe ...	1·72	47	1·37	Nil
Toowoomba ...	2·51	48	1·68	1·64
Warwick	1·39	33	1·11	0·29
Maranoa.				
Roma	1·33	46	0·59	0·51
State Farms, &c.				
Bungeworgorai ...	1·06	6	0·56	0·25
Gatton College ...	1·74	21	0·51	0·26
Gindie	1·32	21	0·85	2·20
Hermitage ...	1·42	14	0·70	0·47
Kairi	3·95	6	5·98	5·75
Sugar Experiment Station, Mackay	5·47	23	7·28	9·52
Warren	1·53	6	0·70	2·31

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for April this year, and for the same period of 1919, having been compiled from telegraphic reports, are subject to revision.

GEORGE G. BOND, Government State Meteorologist.

Pioneer River Farmers and Graziers' Show Association

Annual Show

MACKAY

Wed., 30th June, Thursday, 1st July, 1920

Special Attractions *Liberal Prize Money*
Entries Close 10th June *Schedules on Application*

Ralph G. Johnson, Secretary, Box 31, G.P.O., Mackay